

April 21, 2015

Nancy Rodríguez, P.E.
Chief, Multimedia Permits and Compliance Branch
Caribbean Environmental Protection Division
U.S. Environmental Protection Agency, Region 2
City View Plaza II, Suite 7000
48 RD. 165 Km. 1.2
Guaynabo, Puerto Rico 00968-8069

2016 APR 27 PM 4: 14
RECEIVED
USEPA
OCEPD

RE: Administrative Order on Consent Docket Number CWA-02-2015-3102 –
Compliance with AOC response to EPA' review of submittals letter received 04/02/2015

Dear Rodríguez:

On March 18, 2015 AES Puerto Rico LP ("AES-PR") and the United States Environmental Protection Agency ("EPA") entered into the above referenced Administrative Order on Consent ("AOC"), under which AES-PR is obligated to comply with certain requirements (AOC Section VII, Ordered Provisions). All capitalized terms in this letter shall have the meaning as defined in the AOC.

This communication is in response to your April 2, 2015 letter providing comments to specific AES-PR submittals related to specific paragraphs of the AOC referenced above. AES-PR hereby addresses the following outstanding items from your communication:

- Paragraph 68 (Benchmark Monitoring and Laboratory Analyses): AES- PR will conduct the benchmark monitoring and submit the corresponding MDMRs according to the AOC submittal deadlines.
- Paragraph 69 (Preparation and Submittal of MDMRs): AES- PR will prepare and submit the corresponding MDMRs according to the AOC submittal deadlines.
- Paragraph 71 (Preparation and Submittal of Comprehensive Site Inspection Reports): As required by Sections 4.3.1 and 4.3.2 of the 2008 Multi Sector General Permit (MSGP), AES's December 19, 2013 Comprehensive Site Inspection (CSI) covered "all areas of the facility affected by the requirements in this permit..." and documented the findings from the examination of such areas using the Form provided in Appendix I of the MSGP. The 2013 CSI took into account all the BMPs included in the Matrix approved by EPA and others that were not included in it. This is so because the matrix was developed exclusively to identify new proposed plant BMPs and did not include the existing ones. Furthermore, the Matrix did not include the BMPs of the marine cargo dock facility.

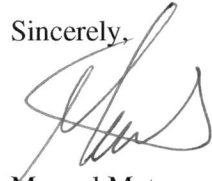
The sub-basins delineated in the Engineering Analysis Report were developed strictly based on hydrological considerations. The geographical boundaries of these sub-basins overlap several operational areas, therefore they are difficult to follow in the field during an inspection and as explained above, do not include "all areas of the facility affected by the requirements in this permit..." therefore using them would be onerous and result in an incomplete CSI.

Furthermore, when AES-PR conducts its site inspections as required by our permits, we review all of the BMPs that are in place, including but not limited to, the delineated sub-basins to ensure that all areas in the facility are performing as expected.

On March 25, 2015 AES-PR submitted to EPA a complete and detailed review of all the BMPs implemented at the site as well as before and after pictures depicting the condition of the areas. This was required under the AOC ¶70, to which EPA accepted the report and closed the item. As required by Section 7.2 of the MSGP, our reports are prepared and submitted using the Form provided as Appendix I of the MSGP and therefore no further action should be required regarding this matter.

AES-PR has taken great strides in making this facility fully compliant with the requirements of our permit with the implementation of a significant number of BMPs. This is a direct confirmation of our role of being good custodians of the environment and adhering to our commitments. Should you have any further concerns or comments regarding please contact us so we can promptly address them.

Sincerely,

A handwritten signature in black ink, appearing to read 'Manuel Mata', written over a horizontal line.

Manuel Mata
President AES Puerto Rico

Attachments

Administrative Order on Consent
AES Puerto Rico Coal Fired Power Plant
Docket Number CWA-02-2015-3102
NPDES Tracking Number PRU020663

Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."



Manuel Mata President AES Puerto Rico

4/22/15

Date

Date: April 13, 2015

Chief, Multimedia Permits and Compliance Branch
Caribbean Environmental Protection Division
U.S. Environmental Protection Agency, Region 2
City View Plaza II, Suite 7000
48 RD. 165 Km. 1.2
Guaynabo, Puerto Rico 00968-8069

RE: Administrative Order on Consent Docket Number CWA-02-2015-3102 –
Compliance with AOC Section VII, ¶67

Dear Jose:

On March 18, 2015 AES Puerto Rico LP (“AES-PR”) and the United States Environmental Protection Agency (“EPA”) entered into the above referenced Administrative Order on Consent (“AOC”), under which AES-PR is obligated to comply with certain requirements (AOC Section VII, Ordered Provisions). All capitalized terms in this letter shall have the meaning as defined in the AOC.

Under AOC Section VII ¶67, within thirty (30) calendar days of the Effective Date of the AOC, AES-PR shall prepare, for EPA review and approval, a storm water sampling SOP (SW Sampling SOP) to conduct, document and submit storm water sampling data reports according to the quarterly visual assessment of storm water discharges and benchmark monitoring requirements in the MSGP. Respondent shall begin implementing the SW Sampling SOP upon its submission to EPA for review and approval. Any changes required to the SW Sampling SOP by EPA shall be made by Respondent within thirty (30) calendar days of EPA’s request and be fully implemented at that time.

Please note that AES-PR is submitting this SOP well in advance of the required deadline. We respectfully ask EPA to advise AES-PR promptly, should the agency have any concerns with this submission. Should AES-PR not receive any timely comments from EPA, we will reasonably consider that EPA has agreed that AES-PR has satisfied this requirement of AOC Section VII, ¶67 in full. Should EPA require additional time to review and provide comments back to AES-PR, that review time is of course entirely beyond the control of AES-PR and should be added to the required time frame for AES-PR to comply with this requirement.

Regards,


Manuel Mata

President AES Puerto Rico
Attachments

2015 APR 14 PM 1:03
RECEIVED
U.S. EPA
CARB

Administrative Order on Consent
AES Puerto Rico Coal Fired Power Plant
Docket Number CWA-02-2015-3102
NPDES Tracking Number PRU020663

Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."



Manuel Mata
President AES Puerto Rico

4/13/15

Date

Date: April 13, 2015

Chief, Multimedia Permits and Compliance Branch
Caribbean Environmental Protection Division
U.S. Environmental Protection Agency, Region 2
City View Plaza II, Suite 7000
48 RD. 165 Km. 1.2
Guaynabo, Puerto Rico 00968-8069

RE: Administrative Order on Consent Docket Number CWA-02-2015-3102 –
Compliance with AOC Section VII, ¶67

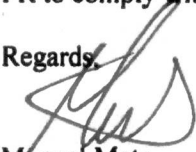
Dear Jose:

On March 18, 2015 AES Puerto Rico LP ("AES-PR") and the United States Environmental Protection Agency ("EPA") entered into the above referenced Administrative Order on Consent ("AOC"), under which AES-PR is obligated to comply with certain requirements (AOC Section VII, Ordered Provisions). All capitalized terms in this letter shall have the meaning as defined in the AOC.

Under AOC Section VII ¶67, within thirty (30) calendar days of the Effective Date of the AOC, AES-PR shall prepare, for EPA review and approval, a storm water sampling SOP (SW Sampling SOP) to conduct, document and submit storm water sampling data reports according to the quarterly visual assessment of storm water discharges and benchmark monitoring requirements in the MSGP. Respondent shall begin implementing the SW Sampling SOP upon its submission to EPA for review and approval. Any changes required to the SW Sampling SOP by EPA shall be made by Respondent within thirty (30) calendar days of EPA's request and be fully implemented at that time.

Please note that AES-PR is submitting this SOP well in advance of the required deadline. We respectfully ask EPA to advise AES-PR promptly, should the agency have any concerns with this submission. Should AES-PR not receive any timely comments from EPA, we will reasonably consider that EPA has agreed that AES-PR has satisfied this requirement of AOC Section VII, ¶67 in full. Should EPA require additional time to review and provide comments back to AES-PR, that review time is of course entirely beyond the control of AES-PR and should be added to the required time frame for AES-PR to comply with this requirement.


Regards,


Manuel Mata
President AES Puerto Rico
Attachments

**Administrative Order on Consent
AES Puerto Rico Coal Fired Power Plant
Docket Number CWA-02-2015-3102
NPDES Tracking Number PRU020663**

Certification


"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."



Manuel Mata
President AES Puerto Rico

4/13/15

Date

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 1 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

Title:

Storm Water Sampling Procedure

Approvals:

	Signature	Date
Prepared by	_____	_____
Reviewed by	_____	_____
Operations Manager	_____	_____
Safety Team Leader	_____	_____
Plant Manager	_____	_____

Distribution List:

1. Operations
2. Engineering
3. Maintenance
4. Environmental Files



	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 2 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

Table of Contents

I.	Purpose.....	3
II.	Scope.....	3
III.	Responsibilities	3
IV.	Safety Precautions.....	4
V.	Applicable Regulatory Requirements.....	4
VI.	Storm Water Discharges.....	5
VII.	Pre-sampling Activities.....	6
VIII.	Sample Collection and Assessment.....	6
IX.	Sample Analysis.....	7
X.	Review and Reporting.....	8
XI.	Follow-up actions.....	8
XII.	Training.....	9
XIII.	References.....	9

Appendices

Appendix 1 Storm Water Sampling Locations Map
 Appendix 2 Automatic Samplers
 Appendix 3 Storm Water Quarterly Visual Assessments Flowchart
 Appendix 4 Quarterly Visual Assessment Form
 Appendix 5 Storm Water Benchmark Monitoring Flowchart
 Appendix 6 Storm Water Sampling Chain-of-Custody Form
 Appendix 7 MSGP Industrial Discharge Monitoring Report (MDMR) Form
 Appendix 8 Training Syllabus
 Appendix 9 Employee Training Attendance Form
 Appendix 10 Rain Gauge SOP

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 3 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

I. Purpose


The purpose of this procedure is to establish specific guidelines for conducting storm water sampling activities, documenting them, submitting related reports and maintaining records according to the quarterly visual assessment and benchmark monitoring requirements of the Environmental Protection Agency's (EPA) 2008 Multi Sector General Permit for Storm Water Discharges from Industrial Activities (2008 MSGP), NPDES Permit PRR050000, Permit Tracking Number PRR05BL65.

II. Scope

This procedure establishes the steps to be followed to conduct, document, report and record storm water sampling events that will be representative of the site's discharges following good practices and taking the required safety precautions.

III. Responsibilities

- A. The Engineering Manager will ensure that this procedure is implemented and followed by the Environmental Coordinator or Designee.
- B. The Environmental Coordinator or Designee will be responsible for following the steps described in this procedure.
- C. The Authorized Designees are the Operation Manager, Water Treatment Team Leader or any person trained on this procedure.

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 4 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

IV. Safety Precautions

- A. All AES-PR employees and contractors must use the required safety and personal protective equipment for conducting the sampling or providing maintenance to the sampling equipment including but not limited to hard hats, safety glasses, safety boots and other as appropriate.
- B. The Environmental Coordinator or Designee will be responsible for generating work orders and obtaining the necessary permit(s) to work for the sampling equipment maintenance activities.


V. Applicable Regulatory Requirements

Under the 2008 MSGP AES-PR is required to performing quarterly visual assessments and quarterly benchmark monitoring of all of its storm water discharges (outfalls) at least once per quarter. The quarterly periods are January 1-March 31; April 1-June 30; July 1-September 30; October 1-December 31.

EPA has grouped the universe of industrial facilities affected by storm water regulations into Sectors. The AES-PR activities are covered under Sectors O - Steam Electric Generating Facilities (SIC 4911-Electric Services) and Q – Water Transportation (SIC 4491-Marine Cargo Handling). The following benchmark monitoring requirements apply to AES-PR under Sectors O and Q:

- Quarterly Benchmark Monitoring (MSGP Part 6.2.1)

Sector- Parameter	Benchmark Monitoring Concentration
O- Total Iron	1.0 mg/L
Q-Total Aluminum	0.75 mg/L
Q- Total Iron	1.0 mg/L

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 5 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

Q- Total Lead	0.262*
Q- Total Zinc	0.260*

* Hardness dependant – receiving water hardness is > 250 mg/L


- Annual Effluent Limitations Guidelines Monitoring (MSGP Part 6.2.2)

Sector- Parameter	Effluent Limit
O(Coal Storage Pile Discharges)-TSS	50 mg/L
O(Coal Storage Pile Discharges)- pH	6.0 min - 9.0 max

NOTE: Sector Q monitoring requirements apply only to the discharges at the dock. Coal storage pile runoff pond is mixed with manufactured aggregate and is not discharged.

VI. Storm Water Discharges

There are three storm water outfalls (sampling points) at AES-PR; outfall SP-001 at the marine dock area, outfall SP-002 located at Gate #3 (plant south side entry gate) and SP-003 located at Gate # 2 (plant west side entry gate). These outfalls are shown in Appendix 1- Storm Water Sampling Locations Map. Appendix 2 describes the automatic samplers installed at each outfall. The maintenance of the automatic samplers will be included in the Preventive Maintenance Program in the Computerized Maintenance Management System (CMMS). Every six months a PM order will be generated by the CMMS.

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 6 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

VII. Pre-Sampling Activities


Prior to the sampling event, conduct the following preparations:

- A. Identify and notify the personnel involved in the sampling;
- B. Contact the laboratory to prepare and deliver the sample bottles with any required preservatives, labels and chain-of-custody forms;
- C. Verify the operation of the automatic samplers using the guide in Appendix 3 and availability of alternate manual sampling equipment;
- D. Collect Sampling Supplies e.g. disposable gloves, sampling containers, labeled sample bottles, rain gear, field notebook, indelible pens / markers, clipboard, visual monitoring forms, chain-of-custody forms, safety equipment, cooler / ice;
- E. Secure transportation vehicle.

VIII. Sample Collection and Assessment

Samples can be taken by automatic samplers (default option) or manually and must be taken from a storm event that results in an actual discharge (not all rain events will produce a discharge, this will depend on several factors, including how wet is the soil already) that follows the preceding measurable storm event (one that is registered by the rain gauge) by at least 72 hours. This determination will be made from the rain gauge data of the AES-PR weather stations; identified in the field as Station 1 and Station 2. The data from Station 2 will be used only if there is a data loss or malfunction of Station 1. Rainfall data is collected according to SOP-Eng-002 "Rainfall Data Collection Management & Recordkeeping Procedure".

Follow the protocol below to obtain an accurate manual sample. A grab sample is a single sample "grabbed" by filling up a container, either by hand or attached to a pole. Obtaining


	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 7 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

accurate data is vital to your ability to assess how your stormwater control measures are performing.

- Wear disposable powder-free gloves for sampling; never touch the inside of the lid or bottle.
- For oil and grease: fill the glass sample bottle directly from the discharge; never collect in a container first and then transfer to the sample bottle because oily residue will collect along the inside of the first collection bottle and make the sample inaccurate.
- If you have problems accessing the stormwater discharge point (e.g., access is too far or dangerous), use a pole or other appropriate sampling apparatus.
- Sample only stormwater discharging from your facility (i.e., do not sample from puddles, ponds or retention basins).
- Sample from a turbulent section in the central part of the flow; avoid touching the bottom or sides of the stormwater conveyance.
- Fill the sample bottle nearly to the top (meniscus almost at the rim) by holding the opening into the flow of water; do not rinse or overfill the bottles.

For each monitoring event (during the sampling period in the quarter) the date and duration (in hours) of the rainfall event, rainfall total (in inches) for that rainfall event, and the time (in days) since the previous measurable storm event will be recorded. A minimum of one grab sample must be collected at each outfall within the first 30 minutes (first flush) of discharge from a measurable storm event. This is so because the highest concentrations of pollutants will be discharged during the initial 30 minutes of the discharge.

The process for performing quarterly visual assessments of storm water samples is described in Appendix 4. Visual assessment samples must be taken from each outfall, collected in a clean,

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 8 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

clear glass, or plastic container, examined in a well-lit area and documented using Worksheet No. 6 of the Storm Water Pollution Prevention Plan. See Appendix 5.


The process for performing quarterly benchmark monitoring of storm water sampling is described in Appendix 6. Label the benchmark monitoring samples and place them in a cooler partially filled with ice and keep at approximately 39° F until the cooler is picked up by the laboratory. Complete a chain-of-custody form for the samples and place it in a re-sealable plastic bag inside the cooler. Contact the laboratory for pickup. See Appendix 7 for a copy of the chain-of-custody form.

IX. Sample Analysis

All required benchmark monitoring analyses must be conducted in accordance with 40 CFR Part 136 "Guidelines Establishing Test Procedures for the Analysis of Pollutants" analytical methods and using test procedures with quantitation limits at or below benchmark values for benchmark parameters that AES is required to sample.

X. Review and Reporting

The Environmental Coordinator or Designee is responsible for reviewing and verifying the analytical data and preparing / submitting the MSGP Discharge Monitoring Reports (MDMRs) to EPA reports using Appendix 8.

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 9 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

XI. Follow-up Actions

If as a result of the quarterly visual assessments it is found that any control measures are not being properly operated and maintained or if the average of 4 quarterly sampling results exceed an applicable benchmark, the Environmental Coordinator or Designee will review the selection, design, installation and implementation of the control measures to determine if modifications are necessary to meet the effluent limits of the MSGP.


In response to any of the above conditions, the Environmental Coordinator or Designee must prepare a corrective action report within 24 hours of discovery documenting the date the problem was identified, describing the problem and the need for a corrective action.

In addition, within 14 days of discovery of any of the above conditions, the Environmental Coordinator or Designee must document the corrective action taken or the basis for not taking corrective action, the date of initiation and completion of the corrective action and if the SWPPP will be modified as a result of the condition(s) identified or the corrective actions taken.

This documentation will be submitted to EPA by the Environmental Coordinator or Designee in an annual report and retained with the SWPPP.

XII. Training

- A. The AES Pollution Prevention Team members, designated employees and/or contractors responsible for the performance and/or supervision of storm water sampling must receive classroom and hands-on training on this Procedure.

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 10 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

B. Training in this SOP will be provided prior to conducting a sampling and at least every year following the Training Syllabus in Appendix 9.


C. All trainings will be documented using **Appendix 10 – Employee Training Attendance Log.**


XIII. References

- 1- AES Rainfall Data Collection Management & Recordkeeping Procedure. SOP-Eng-002.
- 2- ISCO Stormwater Monitoring Guide. 2008.
- 3- United States Environmental Protection Agency (USEPA). NPDES Storm Water Sampling Guidance Document EPA 833-B-92-001. July 1992.
- 4- USEPA. NPDES Inspection Manual. July 2004.
- 5- USEPA. Final National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Form Industrial Activities, Federal Register, Vol. 73, No. 189, September 29, 2008.
- 6- USEPA. Industrial Stormwater Monitoring and Sampling Guide EPA 832-B-09-003 Final Draft. March 2009.
- 7- 40 CFR 136 Guidelines Establishing Test Procedures for the Analysis of Pollutants.

REVISION HISTORY:


<u>Revision Number</u>	<u>Revision Summary</u>	<u>Date</u>
1		
2		

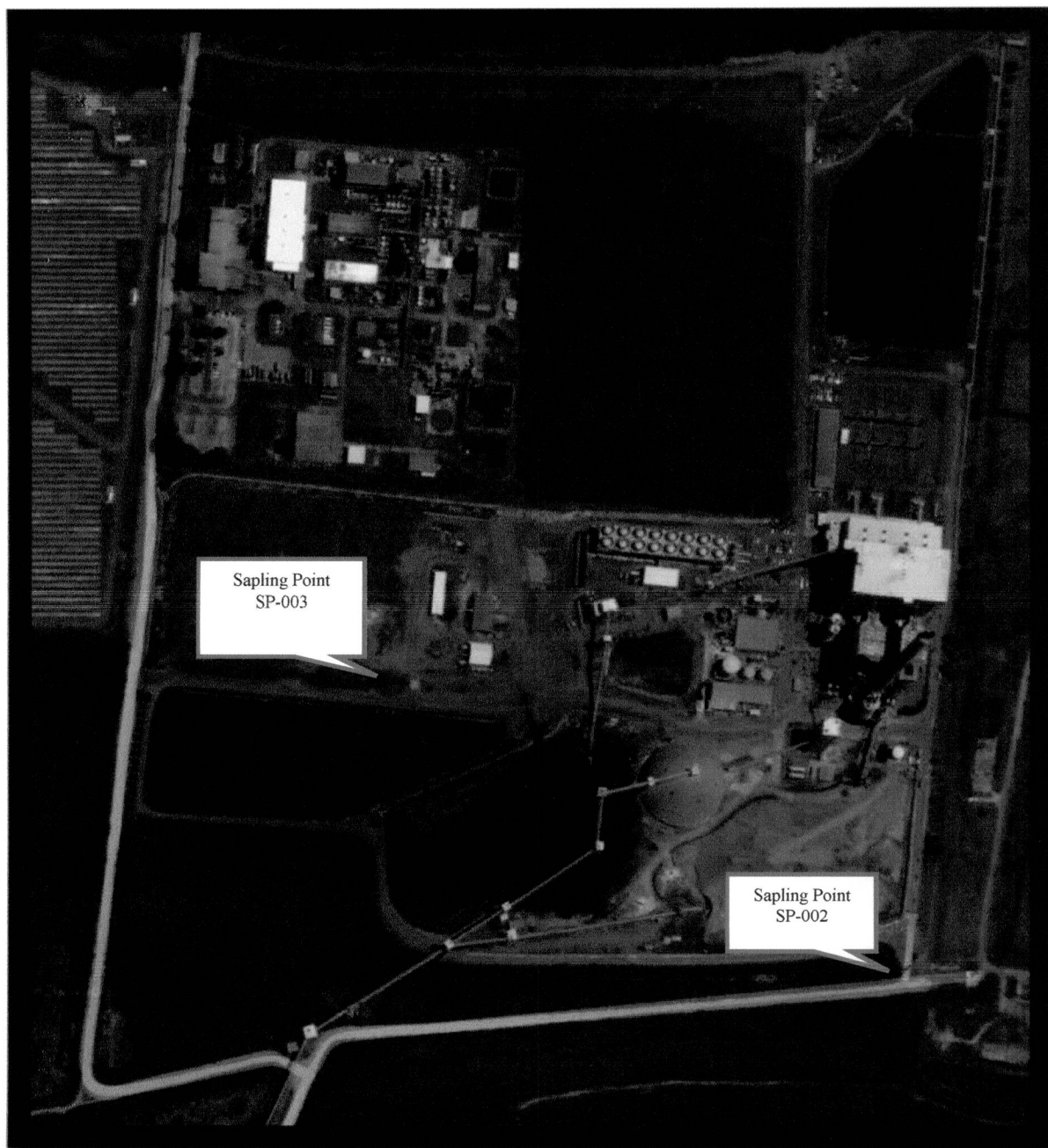
	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 11 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:


	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 12 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

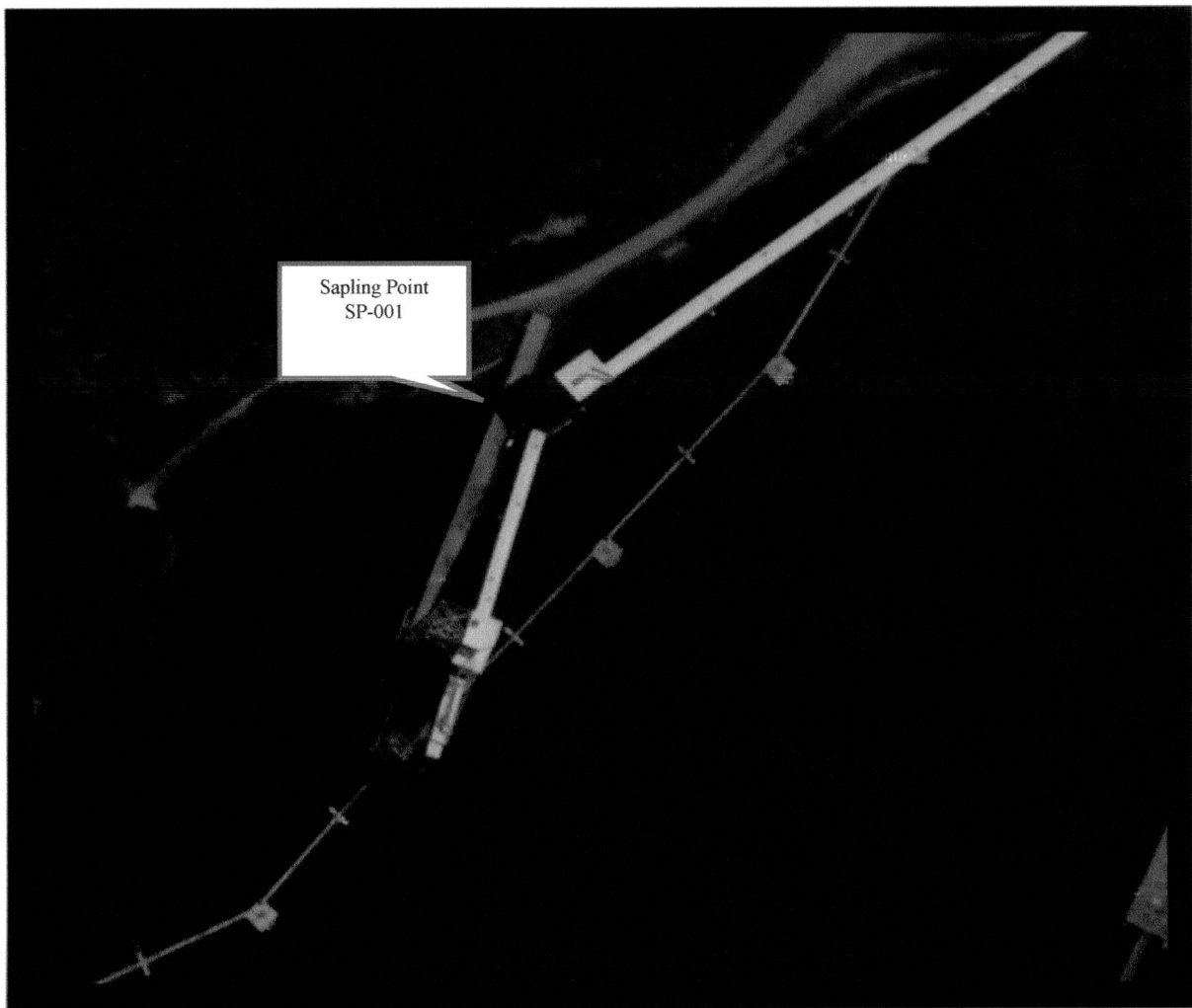
APPENDIX 1


STORM WATER SAMPLING LOCATIONS MAP

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 13 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations	Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:	




	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 14 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:



	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 15 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 2

AUTOMATIC SAMPLERS

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 16 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations	Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:	


AES PR Storm Water Automatic Samplers

Existing Sampling Equipment Description:

- SP-001
 - Location: Marine Dock Area
 - Manufacturer: ISCO
 - Model: Avalanche Transportable & Refrigerated Sampler
 - Supporting Equipment: 12V Battery, Solar Panel, and Rain Gauge




- SP-002
 - Location: Gate #3 (plant south side entry)
 - Manufacturer: ISCO
 - Model: Avalanche Transportable & Refrigerated Sampler
 - Supporting Equipment: 12V Battery, Solar Panel, Rain Gauge, and Water Level Sensor

	Title: Storm Water Sampling Procedure	Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 17 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations	Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:



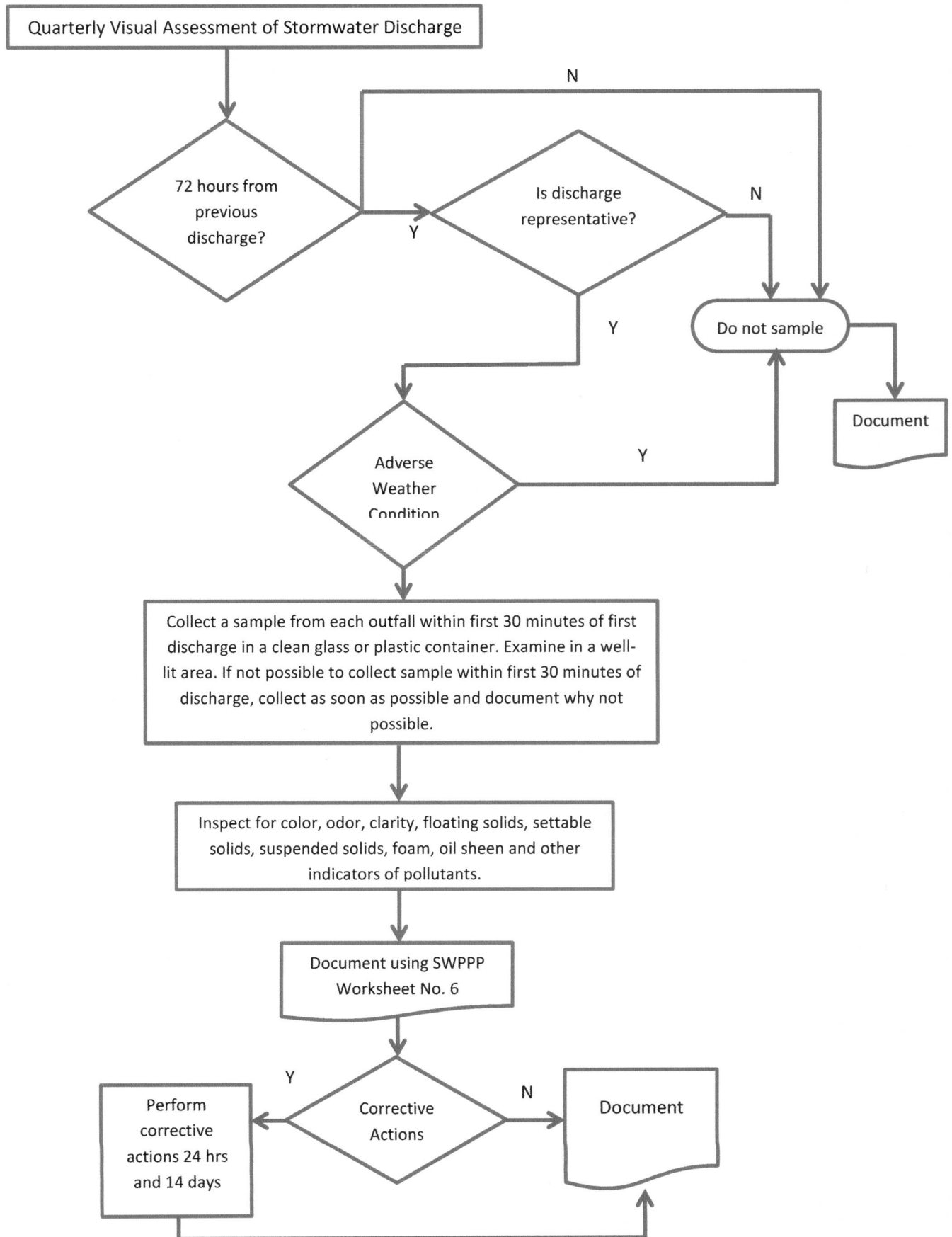
- SP-003
 - Location: Gate #2 (plant west side entry road)
 - Manufacturer: ISCO
 - Model: Avalanche Transportable & Refrigerated Sampler
 - Supporting Equipment: 12V Battery, Solar Panel, Rain Gauge, and Water Level Sensor




	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 18 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 3 STORM WATER QUARTERLY VISUAL ASSESSMENT FLOWCHART

Storm Water Quarterly Visual Assessments Flowchart



	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 19 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 4

QUARTERLY VISUAL ASSESSMENT FORM

AES Puerto Rico, LP
Storm Water Pollution Prevention Plan

MSGP Quarterly Visual Assessment Form

Worksheet No. 6

(Complete a separate form for each outfall you assess)

Name of Facility: AES PR

NPDES Tracking No.

Outfall Name: "Substantially Identical Outfall"? ☐ No ☐ Yes

Person(s)/Title(s) collecting sample:

Person(s)/Title(s) examining sample:

Date & Time Discharge Began:

Date & Time Sample Collected:

Date & Time Sample Examined:

Note: Samples must be examined within an hour.

Substitute Sample? ☐ No ☐ Yes (identify quarter/year when sample was originally scheduled to be collected):

Nature of Discharge: ☐ Rainfall ☐ Snowmelt

If rainfall: Rainfall Amount: _____ inches Previous Storm Ended > 72 hours ☐ Yes ☐ No* (explain):
Before Start of This Storm?

Parameter

Color ☐ None ☐ Other (describe):

Odor ☐ None ☐ Musty ☐ Sewage ☐ Sulfur ☐ Sour ☐ Petroleum/Gas _____
☐ Solvents ☐ Other (describe):

Clarity ☐ Clear ☐ Slightly Cloudy ☐ Cloudy ☐ Opaque ☐ Other

Floating Solids ☐ No ☐ Yes (describe):

Settled Solids** ☐ No ☐ Yes (describe):

Suspended Solids ☐ No ☐ Yes (describe):

Foam (gently shake sample) ☐ No ☐ Yes (describe):

Oil Sheen ☐ None ☐ Flecks ☐ Globs ☐ Sheen ☐ Slick
☐ Other (describe):

Other Obvious Indicators of Stormwater Pollution ☐ No ☐ Yes (describe):

* The 72-hour interval can be waived when the previous storm did not yield a measurable discharge or if you are able to document (attach applicable documentation) that less than a 72-hour interval is representative of local storm events during the sampling period.

** Observe for settled solids after allowing the sample to sit for approximately one-half hour.

Detail any concerns, additional comments, descriptions of pictures taken, and any corrective actions taken below (attach additional sheets as necessary). Insert details

Certification by Facility Responsible Official (Refer to MSGP Subpart 11 Appendix B for Signatory Requirements)


I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. Name:

B. Title:

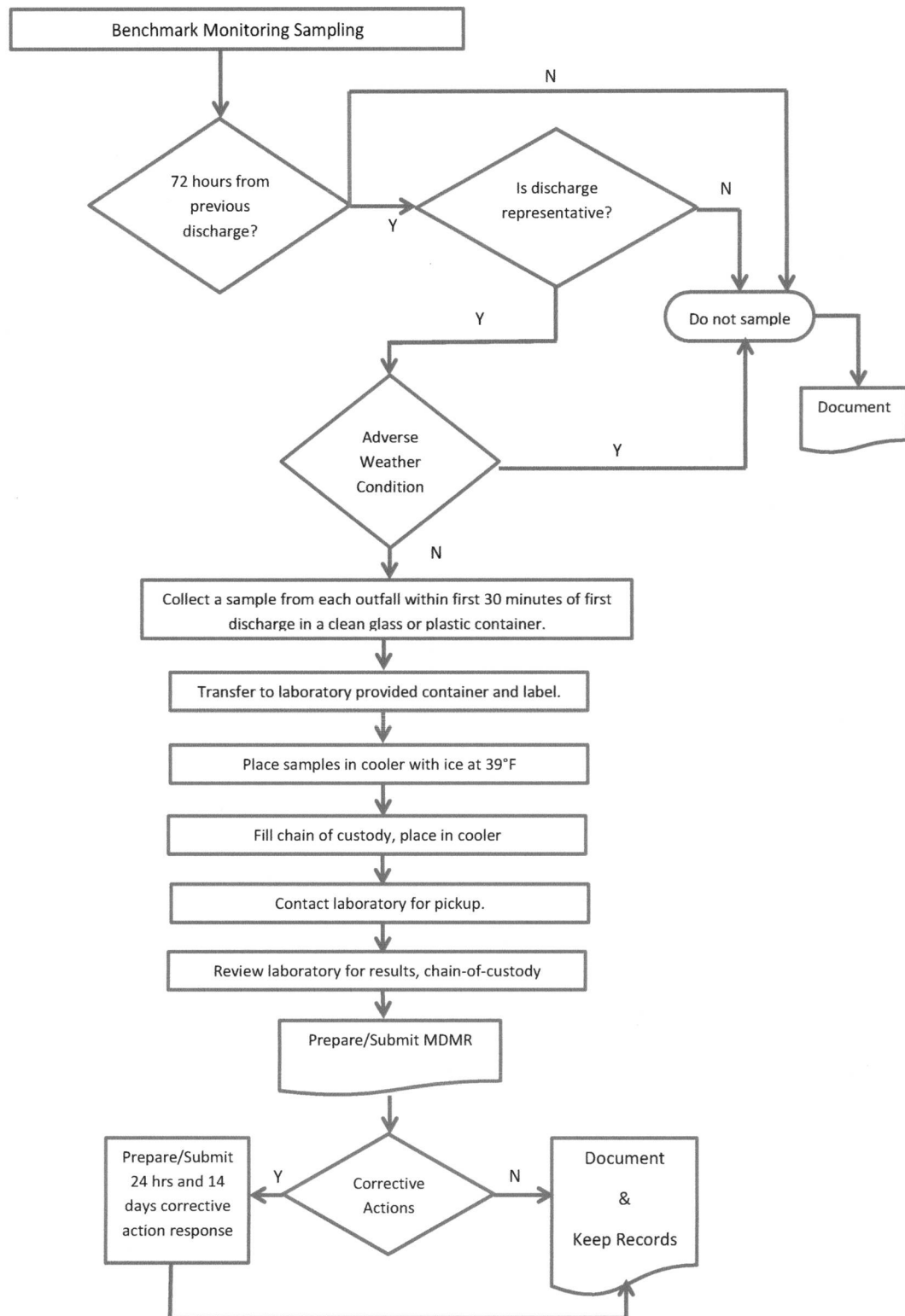
C. Signature:


D. Date Signed:

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 20 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 5 STORM WATER BENCHMARK MONITORING FLOWCHART

Appendix 5
Storm Water Banchmark Monitoring Flowchart



	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 21 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 6

STORM WATER SAMPLING CHAIN-OF-CUSTODY FORM

BECKTON ENVIRONMENTAL LABORATORIES

192 Villa Street • Ponce, P.R. 00730-4875

Tel. 787-841-7373 • Fax 787-841-7313

REVISION 2009

CHAIN OF CUSTODY RECORD

PROJECT NO.	COMPANY	SAMPLER		
SAMPLE LOCATION/CLIENT ID		TIME	AM PM	CONTROL NO. 181445
SAMPLE DATE		BEL. NO.		

1. General Environmental:	PC	VSS	PC
Acidity ()	___	Alkalinity ()	___
Ammonia as N ()	___	Bicarbonate ()	___
BOD-5 ()	___	Bromide ()	___
Chloride ()	___	Chlorine, Res. ()	___
COD ()	___	Color (ADMI) ()	___
Conductivity $\mu\text{mhos/cm}$ ()	___	Color (Pt-Co) ()	___
Dissolved Oxygen ()	___	Cyanide ()	___
Hardness ()	___	Fluoride ()	___
Moisture % ()	___	Iodide ()	___
Nitrite ()	___	Nitrate ()	___
Oil+Grease ()	___	Nitrate + Nitrite ()	___
Phenol ()	___	pH, S.U. ()	___
Phosphorus, Total ()	___	Phosphate, Ortho ()	___
Sett Solids mg/L ()	___	Sett. Solids mL/L ()	___
Sulfate ()	___	Solids, Total ()	___
Sulfite ()	___	Sulfide ()	___
TDS ()	___	Surfactant ()	___
Temperature, °C ()	___	TSS ()	___
TOC ()	___	TKN ()	___
Asbestos ()	___	Turbidity ()	___
TVS ()	___	Carbonate ()	___
Total Nitrogen ()	___		
2. Metals:			
Aluminum (Al) ()	___	Cadmium (Cd) ()	___
Chromium (Cr) ()	___	Copper (Cu) ()	___
Iron (Fe) ()	___	Lead (Pb) ()	___
Manganese (Mn) ()	___	Mercury (Hg) ()	___
Nickel (Ni) ()	___	Selenium (Se) ()	___
Silver (Ag) ()	___	Tin (Sn) ()	___
Zinc (Zn) ()	___	Arsenic (As) ()	___
Barium (Ba) ()	___	Boron (B) ()	___
Antimony (Sb) ()	___	Beryllium (Be) ()	___
Bismuth (Bi) ()	___	Calcium (Ca) ()	___
Chromium, VI (CrVI) ()	___	Cobalt (Co) ()	___
Magnesium (Mg) ()	___	Molybdenum (Mo) ()	___
Potassium (K) ()	___	Silicon (Si) ()	___
Sodium (Na) ()	___	Strontium (Sr) ()	___
Thallium (Tl) ()	___	Titanium (Ti) ()	___
Vanadium (V) ()	___	Lithium (Li) ()	___
3. RCRA/Hazardous wastes			
Ignitability (Flash Pt.) ()	___	Corrosivity ()	___
Reactivity (CN & S) ()	___	TCLP ()	___
RCRA Metals ()	___	Organics-Pest/Herb ()	___
Organics-BNA ()	___	Organics-VOA ()	___
TOX ()	___		
4. Specific Organics			
Volatiles ()	___	Phenols GC ()	___
Pesticides/PCB's ()	___	Semi-Volatiles (BNA) ()	___
Herbicides ()	___	PCB's Only ()	___
BTEX ()	___	TPH 418.1 ()	___
TTO & Dioxin ()	___	TTO ()	___
		TPH 8015 ()	___
		Lindane ()	___
5. Microbiology			
Fecal Coliform ()	___	Total Coliform ()	___

Comments: _____

Sampling Witness: _____

Date/Time: _____

Relinquished by: _____

Date/Time: _____

Received by: _____

Date/Time: _____

Relinquished by: _____

Date/Time: _____

Received by: _____

Date/Time: _____

Relinquished by: _____

Date/Time: _____

Received by: _____

Date/Time: _____

Matrix

air ()	water ()	sludge ()
liquid ()	soil ()	solid ()
oil ()	mixed ()	other ()

Specify: _____

Preservative Codes = PC

- | | |
|---|---------------------------|
| 1. Cool, <6°C | 6. Sodium Hydroxide(NaOH) |
| 2. Sulfuric Acid (H_2SO_4) pH<2 | 7. Zinc Acetate |
| 3. Nitric Acid (HNO_3), pH<2 | 8. Ascorbic Acid |
| 4. Hydrochloric acid (HCl) | 9. FAS |
| 5. Sodium Thiosulfate | 10. Other |

Sample type legend:


grab samples	x
composite samples	xx

Turnaround time: Sampling Equipment:

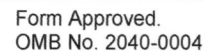
1 day ()	Automatic Sampler ()
2 days ()	Sample Pick Up ()
3 days ()	
5 days ()	

Note: normal turnaround time is ten (10) working days;
additional charges apply for rush orders.

Original

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 22 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 7 MSGP INDUSTRIAL DISCHARGE MONITORING REPORT (MDMR) FORM



Page 1 of 4

E. Monitoring Information

Note: Make additional copies of this form as necessary.

1. Permit Tracking Number:

2. Nature of Discharge: ☐ Rainfall (Complete line items 2.a., 2.b., & 2.c.) ☐ Snowmelt

2.a. Duration of the rainfall event (hours): 2.b. Rainfall amount (inches): 2.c. Time since previous measurable storm event (days):

[illegible]

* (QBM) - Quarterly benchmark monitoring; (ELG) - Annual effluent limitations guidelines monitoring; (S/T) - State- or Tribal-specific monitoring; (I) - Impaired waters monitoring; (O) -Other monitoring as required by EPA

4. Comment and/or Explanation of Any Violations (Reference all attachments here)

F. Certification

	<p>I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.</p>		
<p>Typed or Printed Name/Title of Principal Executive Officer or Authorized Agent</p>		<p>Signature of Principal Executive Officer or Authorized Agent</p>	<p>Date</p>
<p>Email of Principal Executive Officer or Authorized Agent:</p>	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>		

Instructions for Completing the MSGP Industrial Discharge Monitoring Report (MDMR)

Who Must Submit A Discharge Monitoring Report to EPA?

Facilities covered under the Multi-Sector General Permit (MSGP or permit) that are required to monitor pursuant to Parts 6.2, 6.3, and 8 of the permit must submit the MSGP Discharge Monitoring Report (MDMR) consistent with the reporting requirements specified in Part 7.1 of the permit.

Where to File the MDMR Form

Monitoring data collected pursuant to Parts 6.2, 6.3, and 8 of the permit must be submitted electronically via EPA's Electronic Notice of Intent System (eNOI), which can be found at www.epa.gov/npdes/enoi. Filing electronically will allow permittees to easily submit the results of monitoring data to EPA. If you cannot access eNOI, monitoring results must be reported on the paper MDMR form and sent to one of the following addresses:

Via U.S. mail:

U.S. Environmental Protection Agency
Office of Water, Water Permits Division
Mail Code 4203M, ATTN: MSGP Reports
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Via Overnight/Express Delivery:

U.S. Environmental Protection Agency
Office of Water, Water Permits Division
Room 7420, ATTN: MSGP Reports
1201 Constitution Avenue, NW
Washington, D.C. 20004
Phone number: 202-564-9545

Completing the MDMR Form

To complete this form, type or print in uppercase letters in the appropriate areas only. Be sure that you complete all applicable questions. Photocopy your MDMR form for your records before you send the completed original form to the appropriate address above. Use ink when you sign and mail the original document – EPA will not accept photocopies. You may also use this paper form as a checklist for the information you will need when submitting a MDMR electronically via EPA's eNOI system.

Reasons for Submission

Indicate your reason(s) for submitting this MDMR by checking all boxes that apply. The reasons for submission are defined as follows:

- **Submitting monitoring data:** For each storm sampled, submit one MDMR form with data for all outfalls sampled. Select this reason even if you only have monitoring data for some of your outfalls (i.e., some outfalls did not discharge). If you select this reason you are required to complete all Sections of the form.
- **Reporting no discharge for all outfalls for this monitoring period:** Indicates that there were no discharges from all outfalls during this monitoring period. If you select this reason you are only required to complete Sections A, B, C.1, D, and F.
- **Reporting that your site status has changed to inactive and unstaffed:** Indicates that your facility is currently inactive and unstaffed (See Part 6.2.1.3 of the permit for more information). If you select this reason you are only required to complete Sections A, B, and F and include date of status change in the comment field in Section E.4.
- **Reporting that you site status has changed from inactive to active:** Indicates that your facility is currently active (See Part 6.2.1.3 of the permit for more information). If you select this reason you are required to complete all Sections of the form and include date of status change in the comment field in Section E.4.
- **Reporting that no further reductions are achievable for all outfalls and for all pollutants via Part 6.2.1.2 of the permit:** Indicates that your facility has determined that no further pollutant reductions are technologically and economically practicable in light of best industry practice to meet the technology-based effluent limits or are necessary to meet the water-quality-based effluent limitations in Parts 2 of the permit (See Part 6.2.1.2 of the permit for more information). If you select this reason you are required to complete Sections A, B and F. However, if you can make this finding for some outfalls and pollutants, but not for others, you cannot select this reason; you will instead be able to identify which outfalls and which pollutants you can make this finding for in Section E.

Section A. Permit Tracking Number

Enter the National Pollutant Discharge Elimination System (NPDES) tracking number assigned by EPA's Stormwater Notice Processing Center to the facility. If you do not know the tracking number, you can find the tracking number assigned to your facility on EPA's Notice of Intent (NOI) Search website (www.epa.gov/npdes/noisearch).

Section B. Facility Information

1. Enter the facility's official or legal name. Unless the name of your facility has changed, please use the same name provided on your NOI. You can use EPA's NOI Search website (www.epa.gov/npdes/noisearch) to view your NOI.
- 2.a-d. Enter the street address, including city, state, and zip code of the actual physical location of the facility. Do not use a P.O. Box.
3. (Optional) Identify the name, telephone number, and email address of the person who will serve as a contact for EPA on issues related to monitoring at your facility. This person should be able to answer questions related to stormwater discharges and monitoring or have immediate access to individuals with that knowledge. This person does not have to be the facility operator, but should have intimate knowledge of monitoring activities at the facility.
4. If the form was prepared by someone other than the person who is signing the certification statement in Section F (for example, if the MDMR was prepared by a member of the facility's stormwater pollution prevention team or a consultant for the certifier's signature), include the name, organization, phone number and email address of the MDMR preparer.

Section C. Discharge Information

1. Indicate the appropriate monitoring period (Quarter 1, 2, 3, or 4) covered by the MDMR. "Alternative" monitoring periods can apply to facilities located in arid and semi-arid climates, or in areas subject to snow or prolonged freezing. To use alternative monitoring periods, you must provide a revised monitoring schedule here in the first monitoring report submitted and indicate for which alternative monitoring period you are reporting monitoring data. If using alternative monitoring periods, identify the first day of the monitoring period through the last day of the monitoring period for each of the four periods. The dates should be displayed as month (Mo) / day (Day). See Parts 6.1.6 and 6.1.7 of the permit for more information.
2. If you are submitting benchmark monitoring data, identify if your facility is required to collect benchmark samples for one or more hardness-dependent metals (i.e., cadmium, copper, lead, nickel, silver, and zinc). If you select "yes" to this question you must also complete Question 2.a. and if you select "no" to this question you may skip to Section D.
- 2.a. If you selected "yes" for Question 2 under Section C, then you are required to submit to EPA with your first benchmark report a hardness level, established consistent with the procedures in Appendix J of the permit, which is representative of your receiving water. If your outfalls discharge to more than one receiving water, as reported in your NOI form, you should report hardness for the receiving water with the lowest hardness values. Hardness values must be reported in milligrams per liter (mg/L).

Section D. Outfall Information

1. Enter the total number of outfalls identified in your stormwater pollution prevention plan (SWPPP). Outfalls are locations where stormwater exits the facility, including pipes, ditches, swales, and other structures used to remove stormwater from the facility.
2. Indicate if your facility has two or more outfalls that you believe discharge substantially identical effluents (i.e., stormwater), based on the similarities of the general industrial activities and control measures, exposed materials that may significantly contribute pollutants to stormwater, and runoff coefficients of their drainage areas. See Parts 5.1.5.2 and 6.1.1 of the permit for more information on substantially identical outfalls.
- 2.a. If you selected "yes" for Question 2 under Section D, then you must list the outfall name(s) in Column 3.B. that you expect to be substantially identical to the corresponding outfall in Column 3.A.
- 3.A. **Monitored Outfall Name:** List name(s) of outfall(s) you are required to monitor in Column 3.A.
- 3.B. **Substantially Identical Outfalls:** List name(s) of outfall(s) substantially identical to "Monitored Outfall" in Column 3.A. (if applicable)].
- 3.C. **No Discharge:** Check box if you are reporting "No Discharge" for the monitored outfall for the reporting period identified in Section C.1.

Example:

3.A Monitored Outfall Name	3.B. Substantially Identical Outfall	3.C. No Discharge
Outfall A	Outfall B; Outfall C	<input type="checkbox"/>
Outfall D		<input checked="" type="checkbox"/>

Reference attachment if additional space is needed to complete the Table Section D.

Section E. Monitoring Information

1. Enter the NPDES tracking number assigned by EPA's Stormwater Notice Processing Center to the facility reported in Section A.
2. For the reported monitoring event indicate whether the discharge was from a rainfall or snowmelt event. If you select "rainfall" then indicate the duration (in hours) of the rainfall event, rainfall total (in inches) for that rainfall event, and time (in days) since the previous measurable storm event in line items 2.a-c. For both rainfall and snowmelt monitoring, you must identify the date of collection for the monitoring event in column 3.g. of the table. If the discharge occurs during a period of both rainfall and snowmelt, check both the rainfall and snowmelt boxes and report the appropriate rainfall information in item 2.a-c. To report multiple monitoring events in the same reporting period, copy Page 2 of this Form and enter each monitoring event separately with data for all outfalls sampled.

For each pollutant monitored at an outfall, you must complete one row in the Table as follows:

- 3.a. **Outfall Name:** Provide the outfall name for which you monitored (e.g., Outfall 1, Outfall 2, Outfall 3).
- 3.b. **Monitoring Type:** Provide the type of monitoring using the specified codes, in parentheses, below:
 - (QBM) – Quarterly benchmark monitoring
 - (ELG) – Annual effluent limitations guidelines monitoring;
 - (S/T) – State- or Tribal-specific monitoring;
 - (I) – Impaired waters monitoring; or
 - (O) – Other monitoring as required by EPA.
- 3.c. **Parameter(s):** Enter each "Parameter" (or "pollutant") monitored. For QBM and ELG monitoring, use the same parameter name as in Part 8 of the permit.
- 3.d. **Quality or Concentration:** Enter sample measurement value for each parameter analyzed and required to be reported. Enter "ND" (i.e., not detected) for any sample results below the method detection limit or "BQL" (i.e., below quantitation limit) for sample results above the detection limit but below the quantitation limit.
- 3.e. **Units:** Enter the units for sample measurement values (i.e., "mg/L" for milligrams per liter) for each parameter analyzed and required to be reported. For monitoring results reported as ND or BQL this space will be left blank and the units will be reported in Column 3.f.
- 3.f. **Results Description:** This section must be completed for any monitoring results reported as ND or BQL in the "Quality or Concentration" column. For ND, report the laboratory detection level and units in this column. For BQL, report the laboratory quantitation limit and units in this column.
- 3.g. **Collection Date:** Identify the sampling date for each parameter monitoring result reported on this form.
- 3.h. **Exceedance due to natural background pollutant levels:** Check box if following the first 4 quarters of benchmark monitoring (or sooner if the exceedance is triggered by less than 4 quarters of data) you have determined that the exceedance of the benchmark is attributable solely to the presence of that pollutant in the natural background for that outfall and any substantially identical outfalls. See Part 6.2.4.2 of the permit for more information. Attach supporting rationale for your determination to the submitted MDMR and reference attachment in Section E.4.
- 3.i. **No further pollutant reductions achievable:** Check box if after collection of 4 quarterly samples (or sooner if the exceedance is triggered by less than 4 quarters of data), the average of the 4 monitoring values for any parameter exceeds the benchmark and you have made the determination that no further pollutant reductions are technologically available and economically practicable and achievable in light of best industry practice to meet the technology-based

effluent limits or are necessary to meet the water-quality-based effluent limitations in Parts 2 of the permit (See Part 6.2.1. of the permit for more information) for that outfall and any substantially identical outfalls. Attach supporting rationale for your determination to the submitted MDMR and reference attachment in Section E.4.

4. Where violations of the permit requirements are reported, include a brief explanation to describe the cause and corrective actions taken, and reference each violation by date. Also, this section should include any additional comments such as are required when changing site status from inactive and unstaffed to active or vice versa. Attach additional pages if you need more space.

Attach additional copies of Section E as necessary to address all outfalls and parameters.

Section F. Certification

Enter "Name/Title of Principal Executive Officer or Authorized Agent" with "Signature of Principal Executive Officer or Authorized Agent," "Date" form was signed and email of the "Principal Executive Officer or Authorized Agent." If you submit multiple pages of Section E monitoring data, each page must be appropriately signed and certified as described below.

Certification statement and signature (see Section B.11 in Appendix B of the permit for more information). Federal statutes provide for severe penalties for submitting false information on this reporting form. Federal regulations require this form to be signed by one of the following individuals, or a duly authorized representative of that person, as follows:


For a corporation: by a responsible corporate officer, which means:

- (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or
- (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or
For a municipal, State, Federal, or other public facility: by either a principal executive or ranking elected official.


Paperwork Reduction Act Notice

Public reporting burden for this certification is estimated to average 7.25 hours per response plus an additional 2 hours for respondents required to gather hardness data, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Director, Office of Environmental Information Services, Collection Services Division (2823), USEPA, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Include the OMB control number of this form on any correspondence. Do not send the completed MDMR form to this address.

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 23 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 8

TRAINING SYLABUS

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 24 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

STORM WATER SAMPLING TRAINING SYLABUS

Subject Category: Compliance with permit requirements

Training Length: 2- 4 hr

Delivery Mode: Lecture, field exercise

Training Instructional Materials / Handouts: Power Point Presentation and Hard Copies

Schedule: Once / year

Training Purpose: Provide information to employees designated to perform storm water sampling activities required by EPA's Multi Sector General Permit

Instructors: AES or contracted


Written Exam: No

Practical Exam: Yes

WEB Resource: www.epa.gov/stormwater

Topics to be covered:


- Storm Water Regulations Overview**
- AES Storm Water Management and Discharge**
- Location of Storm Water Sampling Points**
- Sampling Equipment Operation**
- Pre-sampling Activities**
- Sample Collection and Evaluation**
- Sample Documentation**
- Review of Sampling Results**
- Reporting and Recordkeeping**
- Corrective Actions**

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 25 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 9


EMPLOYEE TRAINING

ATTENDANCE FORM

	Title: Storm Water Sampling Procedure		Doc #: SOP-Eng-003	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 27 of 27
	Reviewed by: Csaba Kiss	Area: Environmental / Operations		Effective Date: 03/23/2015	Review Date: 03/23/2016	Rev #:

APPENDIX 10

Rain Gauge SOP

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 1 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations		Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2

Title:

Rainfall Data Collection Management & Recordkeeping Procedure

Approvals:

	Signature	Date
Prepared by	_____	_____
Reviewed by	_____	_____
Operations Manager	_____	_____
Safety Team Leader	_____	_____
Plant Manager	_____	_____

Distribution List:

1. Operations
2. Engineering
3. Water Treatment Team Leader
4. Maintenance
5. Environmental Files


	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 2 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations		Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2

Table of Contents

I. Purpose.....	3
II. Scope.....	3
III. Responsibilities	3
IV. Safety Precautions.....	3
V. Operation of the Rainfall Data Collection System	4
VI. Reporting and Recordkeeping.....	4
VII. Maintenance & Calibration.....	5
VIII. Training.....	6

Appendixes


Appendix 1 Tool Bar Icons

Appendix 2 Rainfall Data Collection Maintenance Checklist

Appendix 3 Integrated Sensor Suite Installation Manual

Appendix 4 Monthly Precipitation Data Log

Appendix 5 Training Attendance Form

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 3 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations		Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2

I. Purpose

The purpose of this procedure is to establish specific guidelines for the Environmental Coordinator or Designee to operate and manage the precipitation data collection system according to the manufacturer's manual to ensure the safe and appropriate operation of the equipment. Also intended to provide guidelines for the proper installation, operation, recordkeeping and preventive maintenance of the on-site Davis Vantage Pro2 Plus wireless weather station; and to meet the storm water inspection and monitoring protocols established in the 2008 Multi Sector General Permit (MSGP).

II. Scope


This procedure establishes the steps to be followed for the operation, management, recordkeeping and maintenance of precipitation data collection system following the manufacturer's recommendations and safety precautions.

III. Responsibilities

- A. The Engineering Manager will ensure that this procedure is implemented and followed by the Environmental Coordinator or Designee.
- B. The Environmental Coordinator or Designee will be responsible for following the steps described in this procedure.
- C. The Authorized Designees are the Engineering Manager, Water Treatment Team Leader or any person trained on this procedure.

IV. Safety Precautions

- A. The Environmental Coordinator or Designee is responsible of using the PPE required for providing maintenance to the weather station equipment.
- B. The Environmental Coordinator or Designee will be responsible for following the safety precautions and obtaining the necessary permit to work for the maintenance activities.

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 4 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2	

V. Operation of the Rainfall Data Collection System




Fig. 1 AES Weather Station 1

A Davis Vantage Pro2 Plus wireless solar power automatic weather station has been installed at the AES property to collect rainfall precipitation data. The Integrated Sensor Suite (ISS) collects weather data and sends it to a console via wireless low power radio. The ISS is solar powered and has a battery backup in case that no solar power is available.

The ISS contains a rain collector, a temperature sensor, a humidity sensor and an anemometer. Temperature and humidity sensors are mounted in a passive radiation shield to minimize the impact of solar radiation on sensor readings. The anemometer measures wind speed and direction.

The Sensor Interface Module (SIM) contains the brain of the ISS and the radio transmitter. The SIM is located in front of the radiation shield in the SIM box. The SIM collects outside weather data from the ISS sensors and then transmits the data to the console.

The console is connected to a computer where the rainfall precipitation data is stored in a server. As a backup, the console also has a memory drive to store data for 3 months. The data can be found in I:/AES Engineering/AES Environmental/Weather Data.

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 5 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2	

AES PR has two weather stations; each weather station will be identified in the field as Station 1 and Station 2. Data from Station 1 will be used for the preparation of US Environmental Protection Agency (EPA) reports. The data from Station 2 will be used only if there is a data loss or malfunction of Station 1.

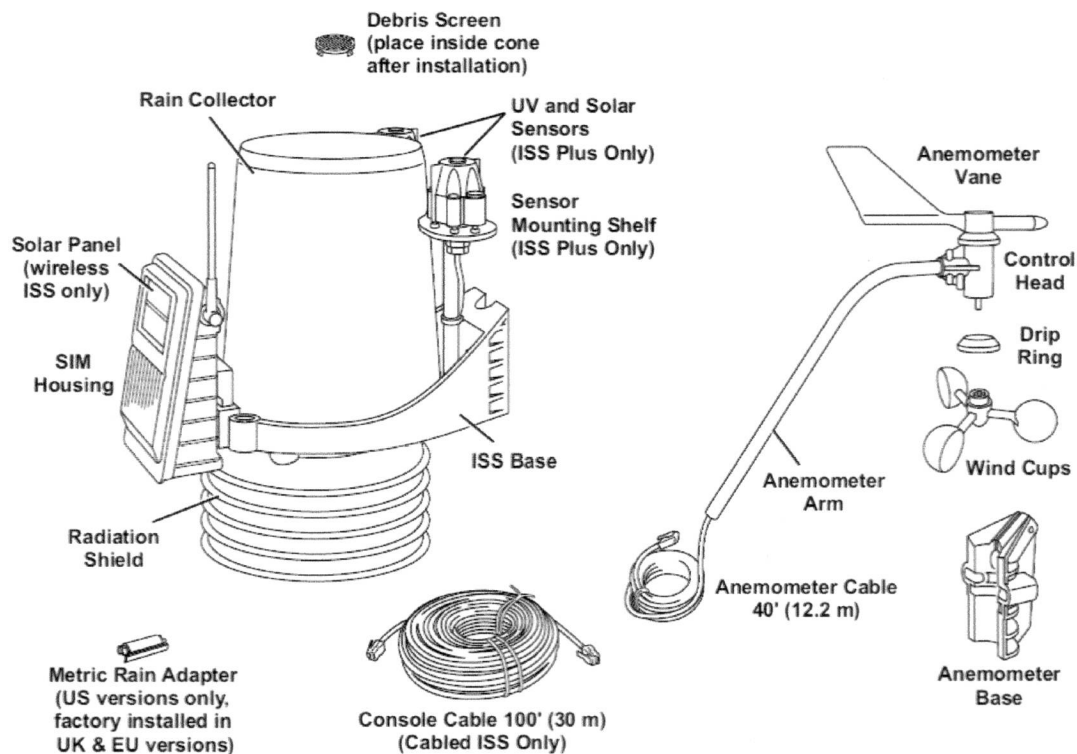






Fig. 2: Davis AES PR Weather Station 1 Components

VI. Reporting and Recordkeeping

1. The Environmental Coordinator or Designee is responsible for retrieving the data on a daily basis and preparing / submitting the EPA reports.
2. On a monthly basis, a report will be generated for each previous month.
3. The precipitation data will be recorded on a 15 minutes time frame on a daily basis to ensure adequate data in order to determine when a storm water inspection (e.g., visual assessment of stormwater discharge) and monitoring activities (e.g., benchmark monitoring) are triggered by the terms and conditions of the 2008 MSGP.
4. To generate the report follow these steps;
 - a. Open the Weather Link Software by clicking in this icon .

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 6 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2	

- b. Click on the Open Station icon .
 - c. Make sure that the selected station name **AESPR-01** and click OK bottom.
 - d. Press the Report Tab and select the Yearly Rainfall.
 - e. Make sure that the weather data is on the screen.
 - f. Press the Print icon  and press OK.
 - g. Make reference to **Appendix 1 - Tool Bar Icons** if necessary.
6. A monthly precipitation data log will be prepared by the Environmental Coordinator or Designee. These logs will be verified and approved by the Engineering Manager or Designee. These logs shall include the certification language of the US Environmental Protection Agency MSGP.
7. These data logs will be kept for 10 years.

VII. Maintenance and Calibration


The maintenance of the weather station will be included in the Preventive Maintenance Program in the Computerized Maintenance Management System (CMMS). Every six months a PM order will be generated by the CMMS. The Environmental Coordinator or Designee will complete the following maintenance steps:

1. Cleaning the Rain Collector Cone

To maintain its accuracy, thoroughly clean the rain collector will be cleaned every six months. To clean the rain collector cone follow these steps:

- a. Unplug the RAIN sensor from the SIM before cleaning so that no inaccurate readings are logged.
- b. Separate the cone from the base by turning it counter-clockwise.
- c. Use a soft, damp cloth to remove any debris from the cone, cone screen, and tipping bucket.
- d. Use a pipe cleaner to clear the funnel hole in the cone and drain screens in the base.
- e. Once all the parts are cleaned, rinse them with clear water.
- f. Re-attach the cone and replace the debris screen.
- g. Plug back the RAIN sensor to the SIM.
- h. Complete this step according to check list on **Appendix 2 - Rainfall Data Collection Maintenance Checklist**.

For further instructions please make reference to **Appendix 3 - Integrated Sensor Suite Installation Manual**.

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 7 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations		Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2

2. Calibration the Rain Collector

The weather station manufacturer doesn't require calibration for the rain collector.

3. Battery Backup Verification


- a. Every six months the battery backup for the ISS will be replaced with a new one.

VIII. Training

- A. An AES employee shall not operate the weather station without proper training.
- B. Trained operators will train inexperienced operators.
- C. Training in this SOP will be provided every year.

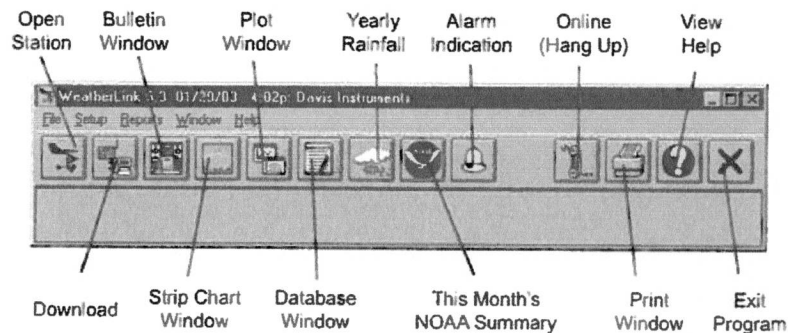
REVISION HISTORY:

<u>Revision Number</u>	<u>Revision Summary</u>	<u>Date</u>
1		01-12-12
2	Incorporate EPA Comments	06-28-12

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 8 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2	

APPENDIX 1

Tool bar Icons



Hot Keys

Main Program Window

Ctrl-A Set Alarms
Ctrl-B View Bulletin
Ctrl-C Station Configuration
Ctrl-G Degree-Days Report
Ctrl-H Hang Up
Ctrl-I Communications Port Settings
Ctrl-J Automatic Download
Ctrl-K Walkthrough
Ctrl-L Download
Ctrl-O Open Station
Ctrl-P Print Active Window
Ctrl-Q Open Plot Window
Ctrl-R Yearly Rain Report
Ctrl-S Open Strip Charts
Ctrl-T Set Time
Ctrl-U Select Units
Ctrl-V View Download Log
Ctrl-X Auto Fax Settings
Ctrl-Y View Summary
Ctrl-Z Close Window
F1 Context-Sensitive Help
F2 Sunrise/Sunset Report
F7 NOAA This Month
F8 NOAA This Year

Strip Chart Window

ESC Halt Redraw
Ctrl-M Make Default
Ctrl-P Print Strip Chart
F1 Context-Sensitive Help
F3 Zoom In
F4 Zoom Out

Plot Window


ESC Halt Redraw
Ctrl-D Choose Date
Ctrl-M Make Default
Ctrl-P Print Plot
F1 Context-Sensitive Help
F3 Zoom In
F4 Zoom Out
F9 Overlay Plots
F10 Last Year Plot

Database Window

Ctrl-D Choose Date
Ctrl-N Add Note
Ctrl-P Print Records
Enter Edit Record
Delete Delete Record
F1 Context-Sensitive Help

Yearly Rainfall Window

Enter Edit Year
Delete Delete Year

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 9 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations		Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2

APPENDIX 2



Rainfall Data Collection Maintenance Checklist

Date:

Station:


<u>Cleaning the Rain Collector Cone</u>	Done
1. Unplug the RAIN sensor from the SIM before cleaning so that no inaccurate readings are logged.	
2. Separate the cone from the base by turning it counter-clockwise.	
3. Use a soft, damp cloth to remove any debris from the cone, cone screen, and tipping bucket.	
4. Use pipe cleaner to clear the funnel hole in the cone and drain screens in the base.	
5. When all parts are clean, rinse with clear water.	
6. Re-attach the cone and replace the debris screen.	
7. Plug back the RAIN sensor to the SIM.	
<u>Battery Backup Verification</u>	
1. Every six month the battery backup for the ISS will be replaced with a new one.	

Notes:

Performed by:

Signature:

Position:

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 10 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2	

APPENDIX 3

Integrated Sensor Suite Installation Manual



For Vantage Pro2™ & Vantage Pro2 Plus™ Weather Stations



Davis Instruments, 3465 Diablo Avenue, Hayward, CA 94545 USA • 510-732-9229 • www.davisnet.com

Contents

Introduction.....	1
Included Components and Hardware.....	1
Cabled ISS Assembly.....	7
Wireless ISS Assembly	9
Preparing the ISS for Installation	13
Installing the ISS	19
Installation Instructions	20
Maintenance and Troubleshooting	25
Appendix	28

FCC Part 15 Class B Registration Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modification not expressly approved in writing by Davis Instruments may void the warranty and void the user's authority to operate this equipment.

FCC ID: IR2DWW6328

IC: 378810-6328

EC EMC Compliance

This product complies with the essential protection requirements of the EC EMC Directive 2004/108/EC; Low Voltage Directive 2006/95/EC; and Eco-Design Directive 2005/32/EC >0.5 watt no-load adapter.

Introduction

The Integrated Sensor Suite (ISS) collects outside weather data and sends the data to a Vantage Pro2 console or Weather Envoy. Wireless and cabled versions of the ISS are available, as well as Standard and Plus versions. The Wireless ISS is solar powered and sends data to the console via a low-power radio. The Cabled ISS sends data and receives power via the console cable.

Note: If you are using a wireless ISS, it can transmit to a Vantage Pro2 console, as well as a Davis Vantage Vue console or Davis Weather Envoy. One ISS can transmit to any number of receivers within its range, so you can add additional consoles to use in different rooms.

The standard version of the ISS contains a rain collector, temperature sensor, humidity sensor and anemometer. In addition to the standard weather features, the ISS Plus adds a pre-installed solar radiation sensor and an ultra-violet (UV) radiation sensor. Temperature and humidity sensors are mounted in a passive radiation shield to minimize the impact of solar radiation on sensor readings. The anemometer measures wind speed and direction and can be installed adjacent to the ISS or apart from it. See "Locating the ISS and Anemometer" on page 17 for siting guidelines.

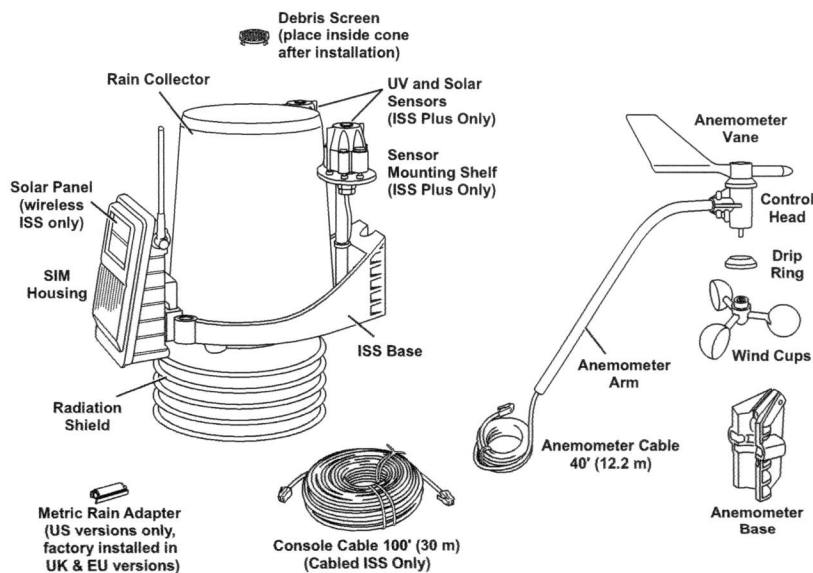
On an ISS Plus, the additional solar and UV sensors are mounted next to the rain collector cone. Separate solar and UV sensors are available to upgrade a standard ISS.

The Sensor Interface Module (SIM) contains the "brains" of the ISS and the radio transmitter. The SIM is located on the front of the radiation shield in the SIM box. The SIM collects outside weather data from the ISS sensors and then transmits the data to your Vantage Pro2 console or Weather Envoy.

Included Components and Hardware

The ISS comes with all the components and hardware shown in the following illustrations. If you purchased your ISS as part of a weather station package containing the Vantage Pro2 console, additional components may be included in the package that are not shown here.

Components

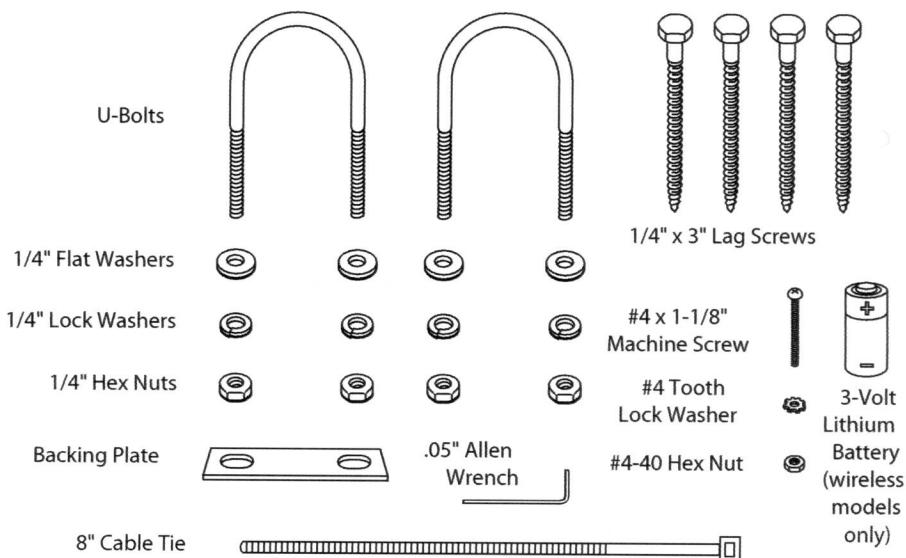


Preparing the ISS for Installation

Note: If the ISS is a Plus model and contains UV and solar sensors, do not touch the small white diffusers on top of the sensors. Oil from skin reduces their sensitivity. If you are concerned that you have touched the diffusers at any time during the installation, clean the UV diffuser using ethyl alcohol with a soft cloth. When cleaning the UV diffuser, **DO NOT** use rubbing or denatured alcohols because they can affect accuracy of the sensor readings. Ethyl alcohol can be procured through an industrial or laboratory supply store. Clean the solar diffuser with a soft damp cloth.

Hardware

The following hardware is included with the ISS and weather station assembly. Some of the hardware is optional based on how the ISS is assembled and installed.



Note: If any of the hardware components are missing or not included, contact Customer Service toll free at 1-800-678-3669 about receiving replacement hardware or other components.

Tools for Setup

The following are additional tools required to set up and install the ISS:

- Small Phillips head screwdriver
- Scissors or wire-cutters
- Adjustable wrench or 7/16" wrench
- Compass or local area map
- Ballpoint pen or paper clip (or other small pointed object)
- Drill and 3/16" (5 mm) drill bit (if mounting on a vertical surface)

Preparing the ISS for Installation

Please follow the steps in the order they are presented. Each step builds on tasks completed in previous steps.

Note: Using a well-lit work table or work area to prepare the ISS for installation is recommended.

The steps to prepare the ISS for installation are:

- Assemble the anemometer.
- Check the factory-installed sensor cable connections to the SIM.
- Connect the anemometer sensor cable to the SIM.

- Apply power to the ISS and test communication with the console.
- Change the Transmitter ID for wireless communication, if necessary.

Assemble the Anemometer

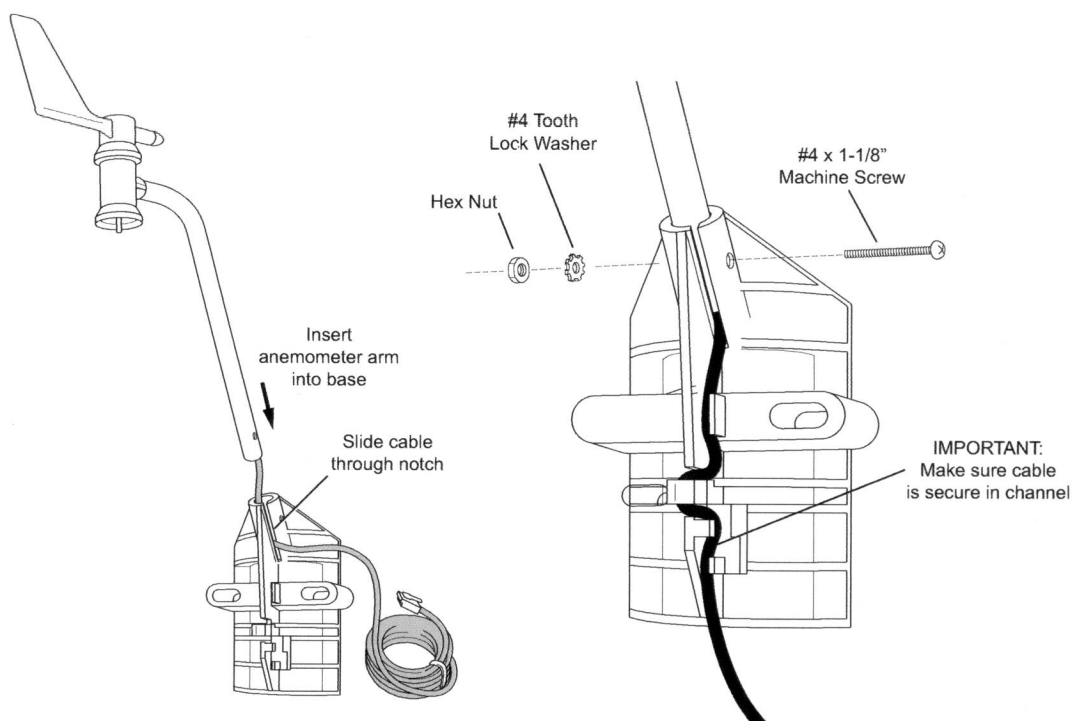
The anemometer measures wind direction and speed. The anemometer arm comes partially assembled with the wind vane attached. The anemometer arm requires assembly before it can be assembled with the rest of the ISS.

Please locate the following parts to prepare the anemometer:

- Anemometer arm (wind vane and cable already attached)
- Anemometer base
- Wind cups
- Drip ring
- Allen wrench (0.05")
- #4 machine screw, #4 tooth-lock washer, #4 hex nut

Attaching Anemometer Arm to Base

1. Insert the anemometer arm into the base, sliding the cable through the notch in the base as shown in illustration.
2. Be sure to line up the small hole in the arm with the holes in the base.
3. Insert the machine screw through the holes in the base and arm.

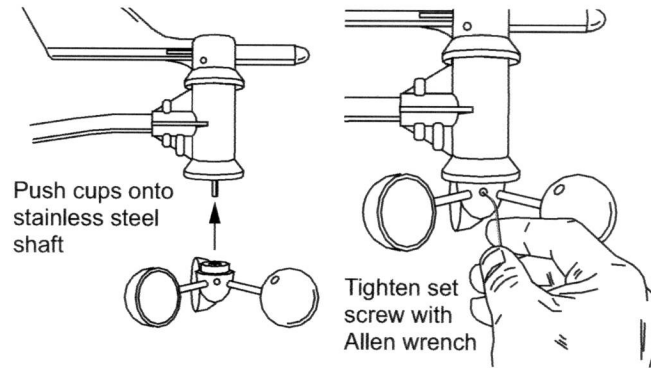


4. Slide the tooth-lock washer and hex nut onto the machine screw. Tighten the hex nut while holding the screw with a Phillips head screwdriver to prevent it from turning.
5. Press the sensor cable firmly and completely into the zig-zagging channel in the base, starting from the arm and progressing downward to the bottom of the base.

Attaching the Wind Cups

1. Push the wind cups up onto the anemometer's stainless steel shaft.
2. Slide the wind cups up the shaft as far as possible.

Note: **Make sure to push the cups onto the stainless steel shaft as far up the shaft as possible. Failure to do so will cause the anemometer to function improperly.**



Attaching Wind Cups

3. Use the Allen wrench provided to tighten the set screw on the side of the wind cups.
The wind cups should drop slightly when you let go.

Note: Ensure that the set screw is screwed in fully and very tight. Failure to do so will cause the anemometer to function improperly.

4. Spin the wind cups.
If the wind cups spin freely, the anemometer is ready and can be set aside while you prepare the rest of the ISS for installation.

Note: **If the wind cups don't spin freely, take them off and repeat the wind cup installation process.**

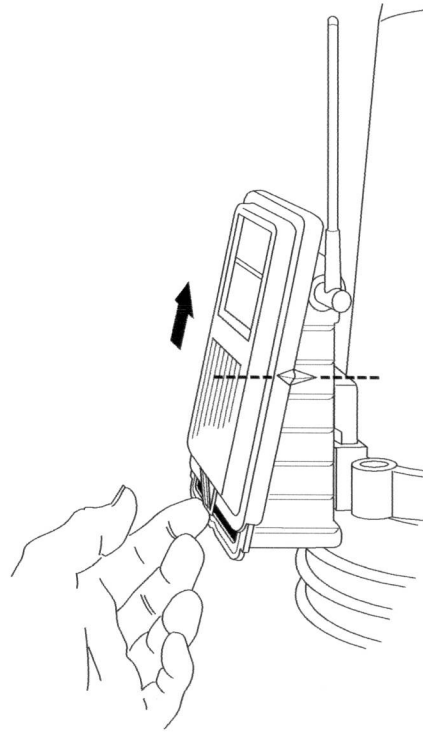
Check SIM Sensor Connections

The SIM is located in the housing on the front of the ISS station. The SIM contains all the connections for the weather sensors of the ISS. Follow the steps below to check the SIM and ensure that all sensors are connected properly.

Open the SIM Box

1. Locate the white box with the solar panel containing the SIM on the front of the ISS unit. The cabled model does not have a solar panel.
2. Locate the white tab at the bottom center of the SIM box cover.
3. Lift the tab away from the box while sliding the cover up.
Look on the side of the SIM box. The box cover can be easily removed from the box when the alignment indicator on the cover is lined up with the alignment indicator on the box.
4. Lift the cover off the box, being careful not to stress the solar panel cable when removing the cover.

The SIM and sensor connectors are visible once the SIM cover has been removed.

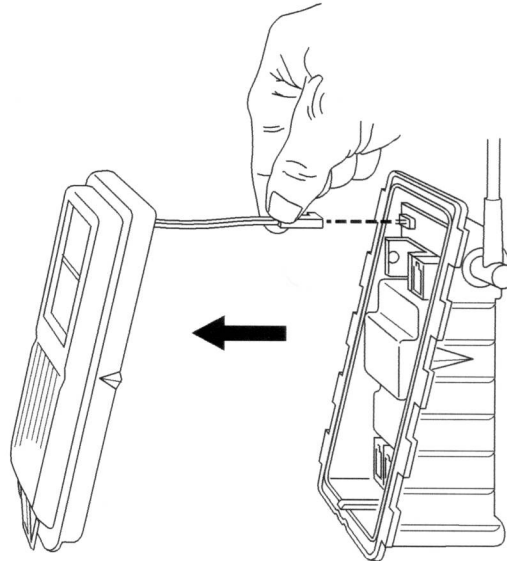


Note: See "SIM Board Display and Contents" on page 29 for information on locating the components and points of interest on the SIM board.

Optional: Disconnect the solar panel connection

The solar panel on the box cover is connected to the SIM by a wire. If the cover cannot be set aside while still connected to the SIM box safely, it should be disconnected from the SIM box. To disconnect the solar power connection:

1. Locate the brown connector for the solar power wire.
2. Pull the connector outward off the brown solar power tab. The solar panel is no longer connected to the SIM.
3. Set the SIM cover aside.



Check the Factory Installed Sensor Connections

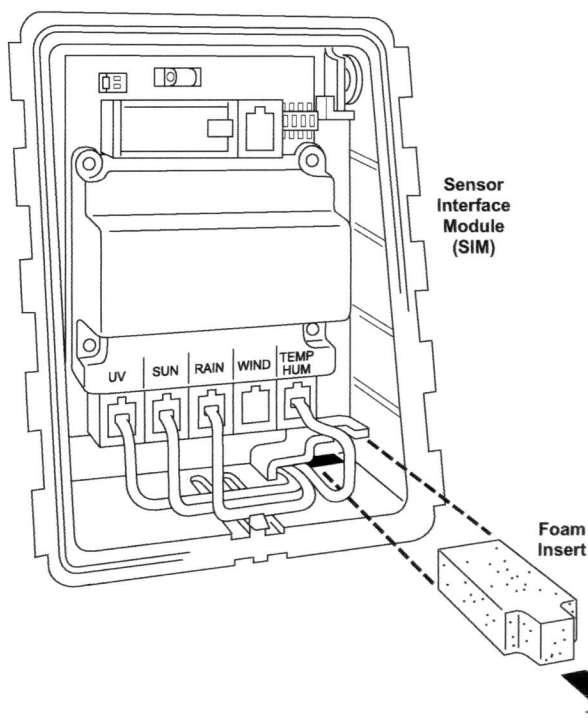
1. Verify that the rain collector and temperature/humidity sensor cables are plugged into the receptacles labeled RAIN and TEMP/HUM on the SIM.
2. If the station includes UV and/or solar radiation sensors, verify that the sensor cables are plugged into the receptacles labeled UV and SUN on the SIM.

Connect the Anemometer Cable to the SIM

1. Unwind the coil of cable enough to work with the anemometer.

Note: Do not unwind the entire coil of anemometer cable at this time.

2. Pull the foam insert out of cable access port in between the cables and set the foam insert aside.
3. Insert the anemometer cable end into the cable access port from beneath the SIM box. Slide the cable through the cable access port with the connector lever down.
4. Firmly insert the end of the anemometer cable into the connector labeled WIND. The lever clicks into place.
5. Make sure that the cables lie flat on the bottom of the cable access port.
6. Firmly insert the foam in between the cables and at the top of the cable access port, taking care to ensure that the foam seals the access port entirely, leaving no holes or gaps large enough for weather or insects.



Note: Only Plus models have UV and solar cables already attached.

Note: If you are assembling a cabled station, wait to reinsert the foam until cable assembly is complete. See "Cabled ISS Assembly" on page 8.

Once the sensor connections have been checked and the anemometer cable has been inserted, a connection between the ISS and the Vantage Pro2 console must be made.

7. Follow the instructions that best apply to your ISS and console:
 - See "Cabled ISS Assembly" on page 8 for assembling Vantage Pro2 weather stations that contain a cabled connection between the ISS and the console.
 - See "Wireless ISS Assembly" on page 11 for assembling Vantage Pro2 weather stations that use a wireless connection to transmit and receive data.

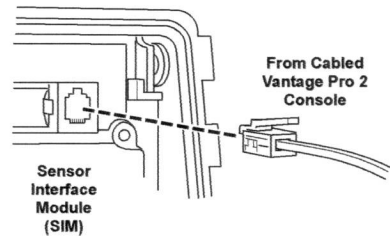
Cabled ISS Assembly

The Cabled ISS system contains a cable for connecting the ISS to a Vantage Pro2 cabled console. Once the anemometer has been installed and the sensors have been checked, a cabled connection between the ISS and the console can be established. Follow the steps below for powering the ISS and connecting to the console.

Applying Power

The 100' (30 m) console cable provides power to the ISS and is used to send data from the ISS to the console. The console cable can be extended up to 1000' (305 m) in length with extension cables purchased from Davis Instruments.

1. Locate the 100' console cable included with your system.
2. Pull the foam insert out of cable access port, if it has been reinserted, and set the foam aside.
3. Insert the console connector cable end into the cable access port from beneath the SIM box. Slide the cable through the cable access port with the connector tab down.
4. On the SIM, firmly insert one end of the 4-conductor cable into the modular connector located apart from the sensor connectors next to the battery insert. This connector is labeled COMM. If you haven't powered up the console yet, refer to the installation instructions in the *Vantage Pro2 Console Manual* and apply power to the console.
5. On the back of your console, insert the other end of the console cable into the modular receptacle labeled "ISS."
6. Firmly insert the foam in between the cables and at the top of the cable access port, taking care to ensure that the foam seals the access port entirely, leaving no holes or gaps for weather or insects. See the graphic on page 6 for more information on inserting the foam insert.



Plugging the console cable into the console powers the ISS and establishes communication between the ISS and the console. The ISS should immediately begin collecting weather data and start sending the data to the console.

Verifying Communication with the Console

Use these steps to verify reception of ISS data at the Cabled Vantage Pro2 console and to test the operation of the ISS sensors.

1. If the console is in Setup Mode, press and hold DONE until the Current Weather screen displays.
Sensor readings from the ISS should display on the screen.
2. Near the center of the screen, look for the outside temperature.
3. Spin the wind cups to check wind speed, pressing WIND if necessary to alternate between speed and direction in the compass rose.
4. Turn the wind vane and allow five seconds for the wind direction display to stabilize before moving it again.
Approximately one minute after power-up the outside relative humidity reading should be displayed on the console.

5. If the ISS contains a UV sensor and/or solar sensor, press 2ND and then press RAIN YR for current ultraviolet readings or press 2ND then press RAIN DAY for solar radiation readings.
The UV reading displays in the center of the console. The solar reading displays in the bottom right corner of the console display. UV and solar readings should be zero or close to zero if the ISS is inside. Zero is a valid reading. Dashes(--) are displayed if no data comes from the sensors.
6. Current weather data displayed on the console confirms communication.
Once the ISS has been powered and the console has successfully received accurate readings from all the sensors, prepare the ISS for installation. Continue on to "Preparing the ISS for Installation" on page 15 for more information.
If the communication problems still exist between the cabled ISS and the console, see "Troubleshooting Cabled ISS Communication" below.
To ease the installation process of ISS at a location, disconnect the console cable from the SIM. Remove the foam and slide the cable out through access port. Once a location for both the ISS and the console has been arranged, reinsert the cable through the access port, into the console connector, and reinsert the foam.

Troubleshooting Cabled ISS Communication

If the console is not receiving sensor readings from the ISS, please try the following troubleshooting procedures.

- Check the console to make sure it is being powered with the AC adapter supplied in the Vantage Pro2 packaged box or three C batteries.

Note: The supplied adapter is a five-volt positive center AC to DC adapter. Other adapters may not work if the voltage or adapter type is different.

- Make sure the cable is firmly plugged into the ISS jack on the console.
- Make sure that the cable is firmly plugged into the correct jack on the SIM.
- Verify that all sensor cables are firmly plugged in.
- An LED indicator light on the SIM flashes each time the ISS transmits, which is about once every 2.5 seconds. If the LED remains dark, there is a problem with the ISS transmitter. Call Technical Support. See "Contacting Davis Instruments" on page 27.

See "SIM Board Display and Contents" on page 29 for information on locating the LED indicator light and the DIP switches.

Note: If the LED is flashing rapidly, call Technical Support. See "Contacting Davis Instruments" on page 27 for more information.

If the console is still not receiving readings, ensure that the console is in Setup Mode and reboot the console by disconnecting the AC power adapter from the console and removing the console batteries for at least 30 seconds. If the console is still not displaying sensor readings from the ISS, please contact Davis Technical Support.

Wireless ISS Assembly

The ISS has a wireless connection to a Vantage Pro2 wireless console. Once the anemometer has been installed and the sensors have been checked, the ISS must be powered and a wireless communication channel must be established between the ISS and the console. Follow the steps below for powering the ISS and establishing a connection to the console.

- Applying Power to a Wireless ISS
- Verifying Communications with the Console
- Verifying Data from the ISS Sensors
- Troubleshooting ISS Reception

Applying Power to a Wireless ISS

1. Insert the 3-volt lithium battery into the SIM.

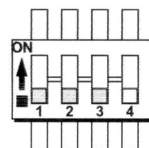
Once powered, the ISS immediately begins transmitting data to the console.

Be sure to match the "+" sign on the battery with the "+" sign on the SIM. See "SIM Board Display and Contents" on page 29.

The SIM stores energy from the solar panel for power at night. The battery is an alternative power source the SIM uses when it is depleted of energy.

Checking Transmitter ID

A Vantage Pro2 console can receive data from up to eight different wireless stations. The default Transmitter ID for the ISS and console is 1.



Settings for Transmitter ID 1:

DIP Switch 1 = OFF

DIP Switch 2 = OFF

DIP Switch 3 = OFF

In most cases it will not be necessary to change the Transmitter ID. The console and ISS should begin communicating automatically when power is applied.

Note: If it is necessary to change the Transmitter ID, remember to use the same ID for the ISS and console. See "SIM Board Display and Contents" on page 29 for locating the components and points of interest on the SIM board.

Verifying Communication with the Console

1. Power the console if it does not already have power. Refer to the *Vantage Pro2 Console Manual* and apply power to the console.
The console automatically enters Setup Mode when powered up.
2. If the console is not in Setup Mode, press and hold DONE then press the down arrow.
The message RECEIVING FROM... and STATION NO. followed by the Transmitter IDs that the console detects displays on the console screen.
3. Look for the ISS Transmitter ID. The number 1 displays unless the Transmitter ID has been changed. If the console displays the ISS Transmitter ID, the ISS is detected.

Note: If the console does not display the number of the ISS Transmitter ID setting, see "Troubleshooting Wireless ISS Reception" on page 12 for more information. It can take several minutes for the console to acquire and display all the available Transmitter IDs.

4. Press and hold DONE to view ISS data once the ISS Transmitter ID displays.
-

Verifying Data from the ISS Sensors

Use these steps to verify reception of ISS data at the wireless Vantage Pro2 console and to test the operation of the ISS sensors.

1. Press and hold DONE until the Current Weather screen displays, if the console is in Setup Mode.
Sensor readings from the ISS should display on the screen.
2. Near the center of the screen, look for the outside temperature.
3. Spin the wind cups to check wind speed, pressing WIND if necessary to alternate between speed and direction in the compass rose.
4. Turn the wind vane, and allow 5 seconds for the wind direction display to stabilize before moving it again.
Approximately one minute after power-up the outside relative humidity reading should be displayed on the console.
5. If the ISS contains a UV sensor and/or solar radiation sensor, press 2ND and then press RAIN YR for current ultraviolet readings or press 2ND then press RAIN DAY for solar radiation readings.
The UV reading displays in the center of the console. The solar reading displays in the bottom right corner of the console display. UV and solar readings should be zero or close to zero if the ISS is inside. Zero is a valid reading — dashes are displayed if no data comes from the sensors.
6. Current weather data displayed on the console confirms successful communication.

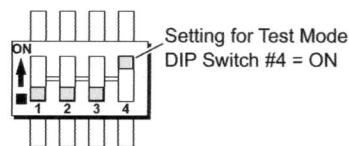
Once the ISS has been powered and the console has successfully received accurate readings from all the sensors, prepare the ISS for installation. Continue on to "Preparing the ISS for Installation" on page 15 for more information.

If the communication problems still exist between the wireless ISS and the console, see "Troubleshooting Wireless ISS Reception."

Troubleshooting Wireless ISS Reception

If the console isn't displaying data from the ISS, perform the following steps:

1. Verify that the console is powered and is not in Setup Mode.
2. Make sure that all ISS sensor cables are firmly connected to the SIM and the ISS battery is properly installed.
3. Walk around the room with the console, standing for a few moments in various locations, to see if you are picking up signals from the ISS. Look on the screen's lower right corner. An "X" toggles on and off when the console receives a transmission.
4. If you do not see the "X" slowly blinking, no matter where you stand with the console, put your ISS in Test Mode.
 - The DIP switch #4 on the SIM is the Test Mode switch. Switch it to the ON position, using a ball-point pen or paper clip.
 - An LED indicator light on the SIM flashes each time the ISS transmits, which is about once every 2.5 seconds.



Note: If the LED is flashing rapidly, call Technical Support. See "Contacting Davis Instruments" on page 27 for more information.

See "SIM Board Display and Contents" on page 29 for information on locating the components and points of interest on the SIM board.

5. If the LED remains dark, there is a problem with the ISS transmitter. Call Technical Support. See "Contacting Davis Instruments" on page 27.
6. If the LED flashes repeatedly but your console isn't picking up a signal anywhere in the room, it could be related to one of the following causes:
 - You changed the ISS Transmitter ID at the ISS or console, but not at both.
 - Reception is being disrupted by frequency interference from outside sources. Interference has to be strong to prevent the console from receiving a signal while in the same room as the ISS. In high-interference environments, it may be preferable to install the Cabled Vantage Pro2.
 - There is a problem with the console.
7. If a problem with receiving the wireless transmission still exists, please contact Technical Support. See "Contacting Davis Instruments" on page 27.
8. When you are finished testing wireless transmission, set DIP switch # 4 to OFF to take the SIM out of Test Mode.

Note: If the SIM is left in Test Mode, the blinking LED will significantly reduce ISS battery life.

Optional: Changing ISS Transmitter ID

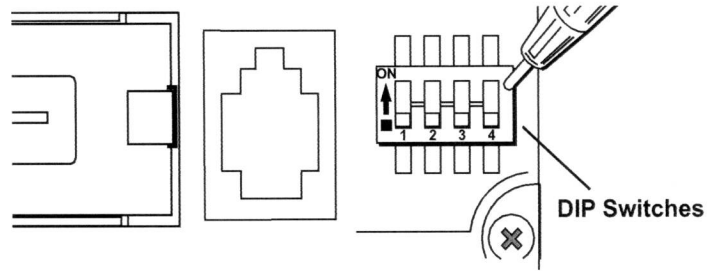
Each wireless transmitting station, including the Integrated Sensor Suite (ISS), uses one of eight selectable Transmitter IDs. DIP switches #1, 2 and 3 on the transmitter control the ID — or channel — the station transmits on. DIP switch #4 is used for transmission testing, not for the Transmitter ID.

Note: The transmitter on the ISS and receiver on the console communicate with each other only when both are set to the same ID.

The default Transmitter ID is 1 for both the ISS and the Vantage Pro2 console, and should work fine for most situations. Change the Transmitter ID if any of the following issues are true:

- Another Davis Instruments wireless weather station operating nearby already uses Transmitter ID 1.
- Additional Vantage Pro2 or Vantage Vue wireless transmitting stations have been purchased with the Vantage Pro2 or Vantage Pro2 Plus and one of the stations has been designated as Station No. 1 instead of the selected ISS.

On the ISS, the Transmitter ID is set using the DIP switches located on the Sensor Interface Module (SIM). To access the SIM, open the SIM housing cover. See "Open the SIM Box" on page 5.



Transmitter ID DIP Switches in Top-right Corner of SIM

To change to another ID, use a ballpoint pen or paper clip to toggle DIP switches #1, 2, and 3. The settings for Transmitter IDs 1 - 8 are shown in the table below.

Set the Vantage Pro2 console to the same ID as the transmitters, as described in the *Vantage Pro2 Console Manual*.

ID CODE	SWITCH 1	SWITCH 2	SWITCH 3
#1 (default)	off	off	off
#2	off	off	ON
#3	off	ON	off
#4	off	ON	ON
#5	ON	off	off
#6	ON	off	ON
#7	ON	ON	off
#8	ON	ON	ON

Using Multiple Transmitting Stations

This table shows the maximum number of each type of station that can be used with a single Vantage Pro2 console. The console can receive signals from a **total** of up to eight transmitters (stations).

Station Type	Maximum Number
Integrated Sensor Suite (ISS)	1
Anemometer Transmitter Kit*	1
Leaf & Soil Moisture/Temperature Station	2**
Temperature Station	8
Temperature/Humidity Station	8

*Replaces the ISS anemometer.

**Two are allowable only if both stations are only partially populated. For example, a network can either have both a Leaf Wetness/Temperature station and a Soil Moisture/Temperature station, or it can have one combined Leaf Wetness and Soil Moisture/Temperature station.

Preparing the ISS for Installation

Once all the sensors have been connected and communication between the ISS and the console has been successfully established, continue to prepare the ISS unit for installation. The steps for preparing the ISS for installation are as follows.

- Close the SIM Box
- Prepare the Solar Panel
- Prepare the Rain Collector
- Site the ISS and Anemometer

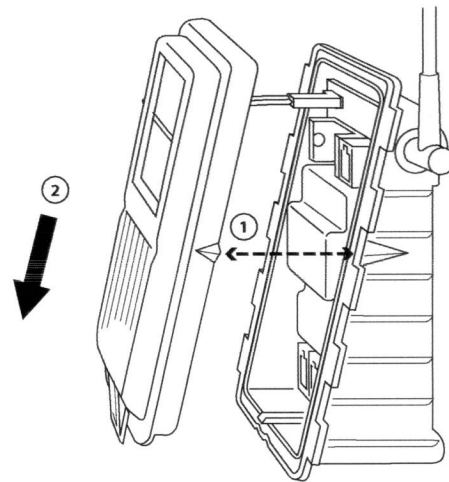
Close the SIM Box

To close the SIM box and continue assembling the ISS:

1. If the solar panel wire was disconnected during ISS assembly, reconnect the wire on the SIM box cover to the solar panel tab on the SIM board.

Note: See "SIM Board Display and Contents" on page 29 for information on locating the solar panel tab.

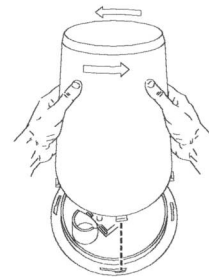
2. Find the two raised alignment indicator lines on both the SIM box and the SIM box cover. Match these alignment indicators as you place the cover against the box.
3. Slide the cover down until it snaps securely in place.



Prepare the Rain Collector

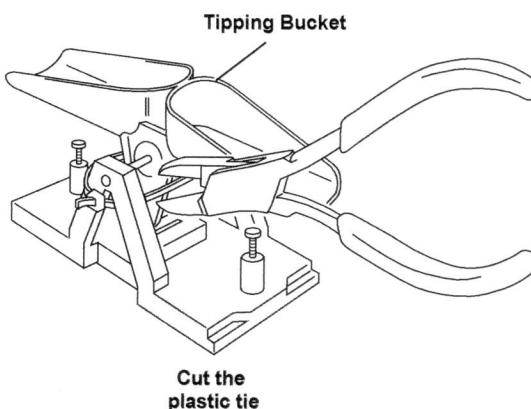
The tipping bucket is secured at the factory to protect it from damage during shipping. To use the ISS properly, the bucket must be released. To release the bucket:

1. Remove the rain collector cone from the ISS base by rotating the cone counter-clockwise. When the cone's latches line up with openings in the base, lift the cone off the ISS base. When new, the cone fits tightly in the base and may require extra pressure to remove. Steady the ISS base between your knees when removing the cone.



Twist to Open

2. Carefully cut and remove the plastic tie that holds the tipping bucket in place during shipping (usually yellow or white in color).
3. On your console screen, look for the DAILY RAIN display. If the console is cabled to the ISS, reconnect the cable and see if the console is receiving rain readings.
4. While watching the daily rain display, tip the bucket until it drops to the opposite side, then wait to see if the display registers a rain reading. Each tip indicates 0.01" or 0.2 mm of rain and may take up to a minute to register at the console. If the bucket is tipped too quickly, the number on the console display may not change.
5. Temporarily reinstall the rain collector cone until you are ready to mount the ISS outside. If you are installing the metric measurement adapter, do not reinstall the rain collector cone.



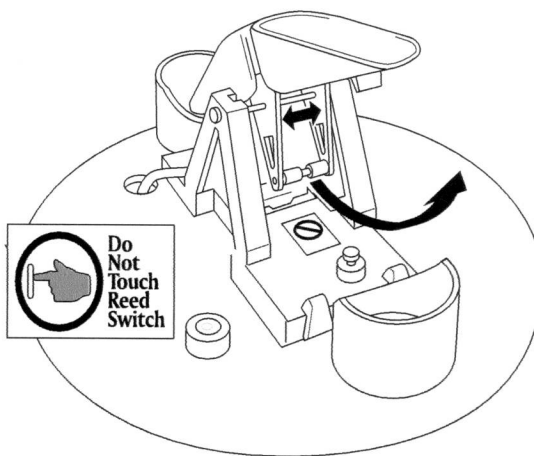
Optional: Insert the Metric Measurement Adapter

The rain collector tipping bucket mechanism contains a standard measurement weight magnet that takes measurements in 0.01" (US versions) or 0.2 mm (UK and EU versions). If you have a US version and would like to convert it to a metric measurement, follow these steps.

Note: EU and UK versions have the metric measurement installed at the factory.

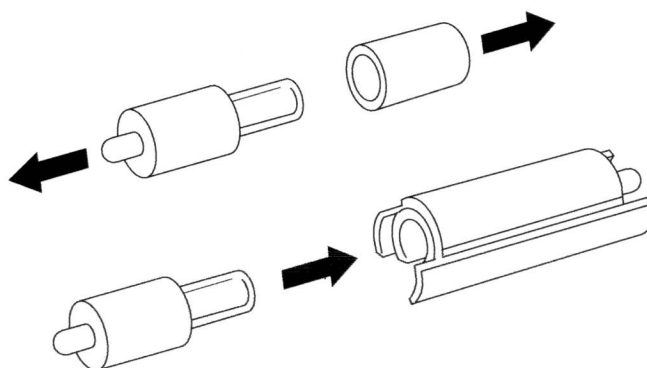
The ISS hardware kit contains a metric adapter that adjusts the weight of the tipping bucket mechanism so that it reports 0.2 mm metric measurements for every tip of the bucket. To install the metric adapter:

1. Find the metric adapter included in the hardware.
2. Locate the magnet between the arms of the bucket.
3. Open the arms slightly with one hand while pulling the magnet out with the other.



Open plastic tipping mechanism arms, pull out magnet

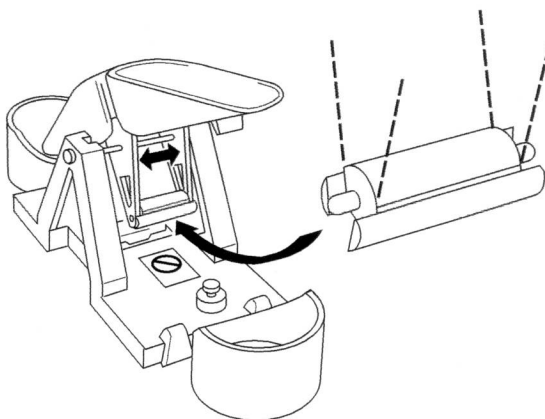
4. Separate an end cap from one end of the magnet.



Separate magnet from one end cap

Insert magnet with other end cap into metric measurement adapter

5. Slide the magnet, exposed end of magnet first, into the open slot of the metric adapter.
6. Insert the metric adapter and magnet between the arms of the bucket, with the solid side of the metric adapter facing up.



**Open plastic arms to insert metric measurement adapter,
with adapter in "V" position**

Note: The above procedure converts the collector to 0.2 mm measurements. The console must be set accordingly. See the *Vantage Pro2 Console Manual* for more information.

Locating the ISS and Anemometer

For the weather station to perform at its best, use these guidelines to select the optimum mounting locations for the ISS and anemometer. Be sure to take into consideration ease of access for maintenance, sensor cable lengths and wireless transmission range when siting the station.

Note: When selecting a location for installing your ISS, especially on a rooftop, make sure it is a location far from power lines. Seek professional help if you uncertain about the safety of your installation.

General ISS Siting Guidelines

- Place the ISS away from sources of heat such as chimneys, heaters, air conditioners and exhaust vents.
- Place the ISS at least 100' (30 m) away from any asphalt or concrete roadway that readily absorbs and radiates heat in the sun. Avoid installations near fences or sides of buildings that receive a lot of sun during the day.
- Ideally, place the radiation shield of the ISS 5' (1.5 m) above the ground in the middle of gently sloping or flat, regularly mowed grassy or naturally landscaped area that drains well when it rains. For areas with average maximum yearly snow depths over 3' (0.9 m), mount the ISS 2' (0.6 m) above this depth.
- Never install the ISS where it will be directly sprayed by a sprinkler system because it will adversely affect the readings.
- Avoid installations near bodies of water such as swimming pools or ponds.
- Do not locate the ISS under tree canopies or near the side of buildings that create "rain shadows." For heavily forested areas, site the ISS in a clearing or meadow.
- Site the ISS in a location with good sun exposure throughout the day if the ISS is wireless or includes solar radiation or UV radiation sensors.

For *agricultural applications* (important for evapotranspiration (ET) calculations):

- Install the ISS and anemometer as a single unit with the radiation shield 5' (1.5 m) above the ground and in the middle of the farm between similar crop types (i.e. two orchards, two vineyards or two row crops), if possible.
- Avoid areas exposed to extensive or frequent applications of agricultural chemicals (which can degrade the sensors).
- Avoid installation over bare soil. The ET formula works best when the ISS is installed over well-irrigated, regularly mowed grass.
- If the last three guidelines cannot be met, install the weather station at the edge of the primary crop of interest.

Anemometer Siting Guidelines

- For best results, place the anemometer at least 7' (2.1 m) above surrounding obstructions such as trees or buildings that obstruct wind flow.
- If mounting on a roof, mount the anemometer at least 7' (2.1 m) above the roof apex (when using a Mounting Tripod, install the anemometer at the very top of the pole).
- If mounting the ISS and the anemometer together, such as on a pole or a wooden post, mount the anemometer so it is at least 12" (0.3 m) above the top of the rain collector cone for best results.
- The standard for meteorological and aviation applications is to place the anemometer 33' (10 m) above the ground. Seek professional help for this type of installation.
- The standard for *agricultural applications* is to place the anemometer 6' (2 m) above the ground. This is important for evapotranspiration (ET) calculations.

Note: For roof mounting, and ease of installation, we recommend using the optional mounting tripod (#7716). For other installations, use the Mounting Pole Kit (#7717).

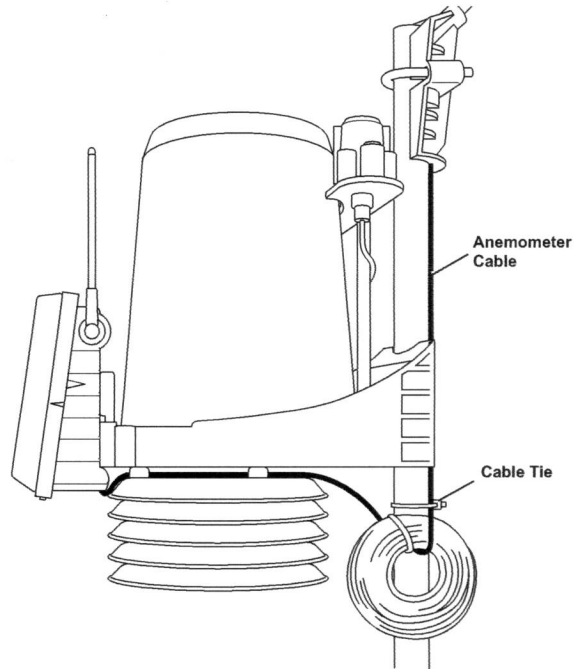
Note: For more detailed siting suggestions, see Application Note #30: Reporting Quality Observations to NOAA on the Davis Support web site (<http://www.davisnet.com/support/weather>).

Optional: Anemometer Cable Length Considerations

- All Vantage Pro2 stations include a 40' (12 m) cable to go between the ISS and the anemometer. This can be extended up to 540' (165 m) using optional extension cables purchased from Davis Instruments.
- If most of the anemometer cable length is unused, the coiled cable length can be stowed once the anemometer and ISS have been installed on a site. Attaching the anemometer cable to the mounting pole using the supplied cable tie is the recommended option.

Keep the anemometer cable coiled if possible during the ISS and anemometer assembly so that it is easily stowed once installation is complete.

- The Cabled Vantage Pro2 includes a 100' (30 m) cable to go between the console and the ISS. This can be extended up to 1000' (300 m) using optional cables.



Optional: Wireless Transmission Considerations

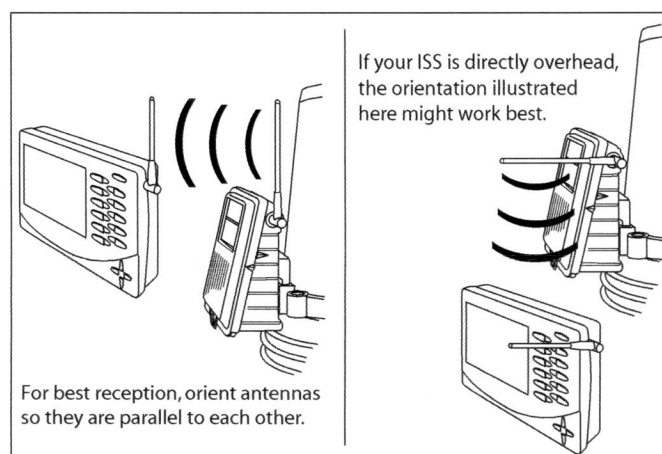
The range of the radio transmission depends on several factors. Try to position the transmitter and the receiver as close as possible for best results.

Typical maximum ranges include:

- Line of sight: 1000' (300 m).
- Under most conditions: 200 - 400' (60 - 120 m).

Other range and transmission considerations include:

- Range may be reduced by walls, ceilings, trees, foliage, a metal roof or other large metal structures or objects such as aluminum siding, metal ducts, and metal appliances, such as refrigerators, televisions, heaters, or air conditioners.
- Frequency interferers also reduce transmission distance. Cordless phones (900 Mhz) are a common example of frequency interference.
- Transmission between wireless units may be obscured by something unidentifiable, or by some obstacle that can't be worked around.
- For best results, orient the ISS antenna and the console antenna so that the orientation and angles of the antennas are parallel to each other.



- If possible, align the pivot joints of both the ISS and the console antennas so that they are facing each other for maximum signal strength.
- The ISS and console antennas do not rotate in a complete circle. Avoid forcing the antennas when rotating it.
- Turn the gain on to improve reception of a weak signal. Refer to the *Vantage Pro2 Console Manual* for information on setting the console gain.
- Consider using a Wireless Repeater (#7626 or #7627) or Long-Range Wireless Repeater (#7653 or #7654) to strengthen the signal or to increase the distance between the ISS and the console.

Testing Wireless Transmission at ISS Location

After a suitable place has been found for the wireless ISS, it is very important to test reception from the installation location before permanently mounting it there.

1. Set the ISS in the desired installation location.
2. Set the console in the desired location.
3. Press and hold TEMP and press HUM to display statistical and reception diagnostics on the console.
 - It's a good idea to test the console's reception anywhere that you might want to use or mount it now or in the future. Take your time. If you aren't picking up a strong signal where you intend to place your console, try rotating the antenna on the console and ISS or try moving the console and ISS to different positions.
 - Irregular terrain in the area may interfere with the signal. For example, if the ISS is mounted downhill from the console, the ground may block a large percentage of the transmitted signal.
4. Press and hold DONE to return to the Current Weather Mode when finished testing.

Note: See the Troubleshooting section of the *Vantage Pro2 Console Manual* for information on how to check wireless signal strength and for more information on troubleshooting reception problems.

Installing the ISS

The anemometer and the main part of the ISS can be installed either together as a single unit on a pole, or apart from each other. The main part of the ISS includes the rain collector, the temperature and humidity sensors, the radiation shield, and the SIM housing. Use the U-bolts to install the ISS and anemometer together or separately on a pole. Use the lag screws to install them separately on a flat, vertical surface.

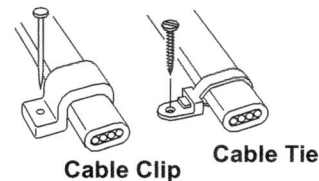
- The anemometer comes with a 40' (12 m) cable for flexibility in configuring the system to monitor wind conditions. For example, the anemometer could be mounted at the highest point of a roof, and the ISS could be mounted on a fence closer to ground level.

General ISS Installation Guidelines

- Install the ISS as level as possible to ensure accurate rain measurements. Use the built-in bubble level (under the rain collector cone, near the tipping bucket mechanism) or carpenter's level to make sure the ISS is level.
- In the Northern Hemisphere, the solar panel should face south for maximum sun exposure.
- In the Southern Hemisphere, the solar panel should face north for maximum sun exposure. Either install the ISS and anemometer separately, each facing north, or mount them as a single unit with solar panel facing north and the wind vane re-oriented to the South.

Optional: Guidelines for Securing Cables

- To prevent fraying or cutting of cables, secure them so they will not whip about in the wind.
- Secure cable to a metal pole using cable ties or by wrapping tape around both the cables and the pole.
- Place clips or ties approximately every 3' – 5' (1 – 1.6 m).
- Mounting clips, cable ties or additional hardware not included with your station can be easily obtained at a hardware or electronics store.



Note: Do not use metal staples or a staple gun to secure cables. Metal staples — especially when installed with a staple gun — have a tendency to cut the cables.

Orient the Wind Vane

The wind vane rotates 360° to display current and dominant wind directions on the compass rose of the console display. To obtain accurate readings, the vane must be *correctly oriented* when mounting the anemometer outside. By default, the wind vane reports the correct wind direction if the anemometer arm points true north.

To ensure correct orientation of the wind vane, mount the anemometer so that the arm points true north.

The wind vane will be ready for use immediately.

If your anemometer arm cannot be mounted aiming true north, you will need to calibrate the wind direction on your console to display accurate wind directions. See your *Vantage Pro2 Console Manual*.

Installation Instructions

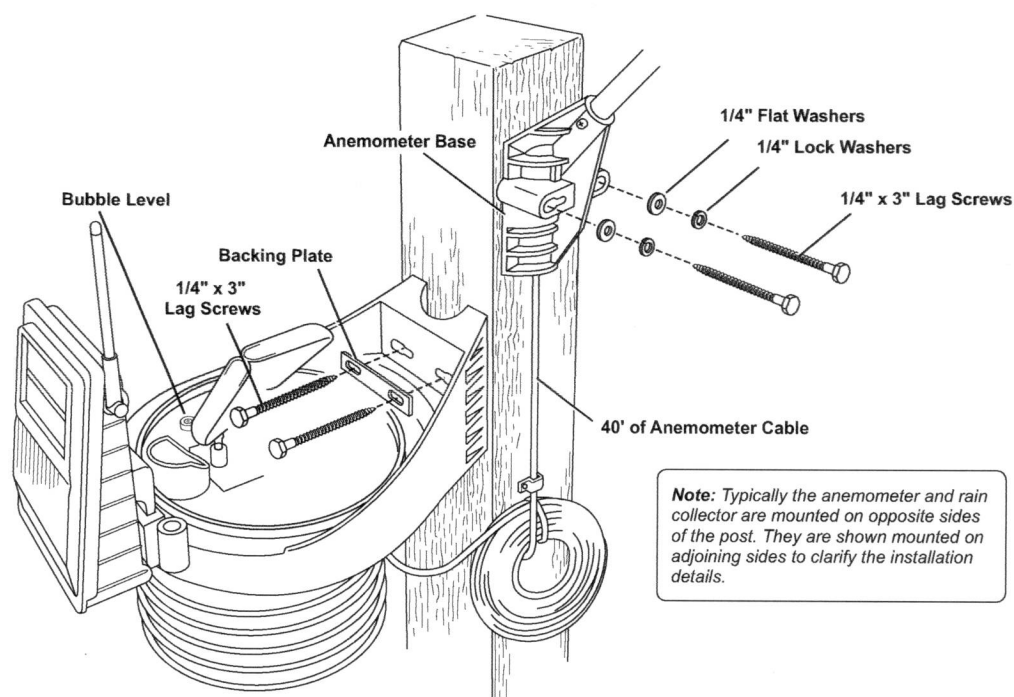
There are several ways to mount and install the ISS unit. The following are installation types that Davis Instruments recommends. Individual ISS locations and installations may vary.

- Installing the ISS on a flat surface
- Installing the anemometer on a post or flat surface
- Installing the ISS on a pole

Note: All installations require that the rain collector cone be removed for assembly. Use the built-in bubble level to ensure the main part of the ISS is level.

Installing the ISS on a Flat Surface

Refer to the following illustration to install the ISS on a post or flat, vertical surface.



Option 1: Installing the ISS on a Post or Flat Surface

1. With a 3/16" (5 mm) drill bit, drill two holes approximately 2 1/8" (54 mm) apart. Use a carpenter's level to ensure the holes are level. Use the metal backing plate as a guide when marking the holes.
2. Remove the rain collector cone if it is installed on the ISS mounting base.
3. Insert the 1/4" x 3" lag screws through the metal backing plate and the holes in the mounting base into the post. Make sure the ISS is level by checking the built-in bubble level.
4. Tighten the lag screws using an adjustable wrench or 7/16" wrench.
5. Re-attach the rain collector cone. Set the cone back on the base so its latches slide downward into the latch openings on the base. Rotate cone clockwise.
6. Place the debris screen (shown in the illustration on page 1) inside the cone, "feet-down" over the funnel hole.

Option 2: Installing the Anemometer on a Post or Flat Surface

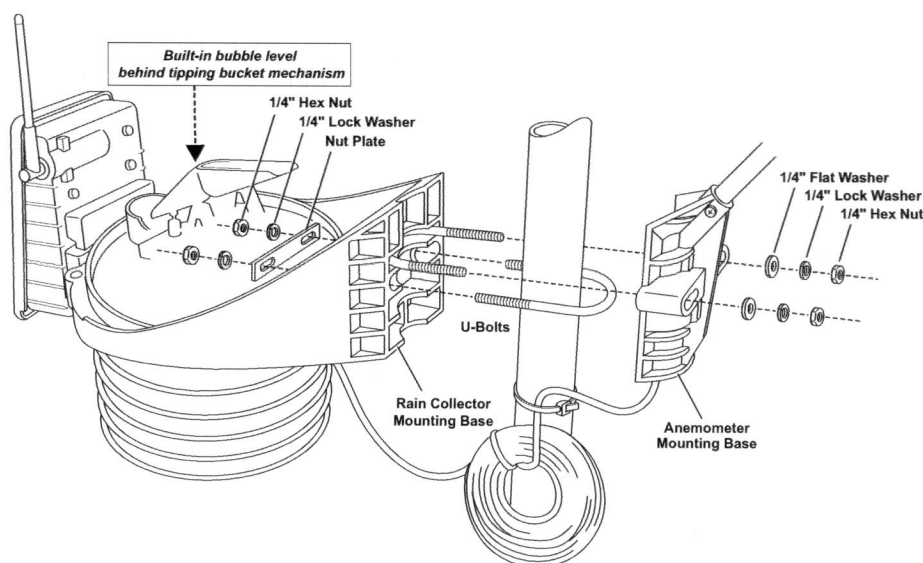
1. With a 3/16" (5 mm) drill bit, drill two holes approximately 2 1/8" (54 mm) apart. Use a carpenter's level to ensure the holes will be level.
2. Insert the 1/4" x 3" lag screws through the flat washers and the holes in the anemometer mounting base into the post.
3. Tighten the lag screws using an adjustable wrench or 7/16" wrench.

Note: If your anemometer cannot be mounted aiming true north, you will need to calibrate the wind direction on your console to display accurate wind directions. See your *Vantage Pro2 Console Manual*.

Installing the ISS on a Pole

When installing the ISS on a pole, the rain collector and radiation shield section of the ISS can be mounted as a single unit with the anemometer section, or the two sections can be mounted separately.

Refer to the following illustration when installing the ISS and/or anemometer on a pole.



Accessories for Pole Mounting

- Use the Mounting Tripod (#7716) for easy roof-mounting.
- Use the Mounting Pole Kit (#7717) to raise the installation height of the ISS by up to 37.5" (0.95 m).

General Guidelines for Installing on a Pole

- With the supplied U-bolts, the ISS and anemometer can be mounted on a pole having an outside diameter ranging from 1 1/4" to 1 3/4" (32 – 44mm).
- Larger U-bolts (not supplied) can be used to mount to a pole with a maximum outside diameter of 2 1/2" (64mm).
- To mount on a smaller pole, obtain a U-bolt that fits the base openings but that has a shorter threaded section. If mounting on a smaller pole with the included U-bolts, the bolt interferes with the rain collector cone.
- Use the built-in bubble level to ensure ISS is level.

Guidelines for Installing the ISS on a Pole

- When mounting the ISS and anemometer together on opposite sides of the pole, remember that whichever side is mounted first, the U-bolt from the opposite side must also be placed around the pole before tightening the U-bolts. (If it is not, there is no way to slide it in later.)
- In each side's mounting base, there is a groove to accommodate the other's U-bolt.
- Once the two sides of the ISS have been loosely mounted together on the pole, swivel the unit to the correct direction and then tighten the hex nuts. The desired height can also be achieved by sliding the ISS vertically.

Option 1: Installing ISS and Anemometer Together

Try to install the ISS so the anemometer arm is aiming north.

Note: If your anemometer arm cannot be mounted aiming true north, you will need to calibrate the wind direction on your console to display accurate wind directions. See your *Vantage Pro2 Console Manual*.

1. Place the U-bolt for the anemometer around the pole so that its round end fits in the top groove of the side of the rain collector side's plastic mounting base. The groove is right above two large holes.
2. While holding the mounting base of the rain collector against the pole, place the two ends of the remaining U-bolt around the pole and through the two holes in the base.
3. Slide the metal backing plate over the bolt ends as they stick out over the rain collector base. Secure the backing plate with a lock washer and hex nut on each of the bolt ends as shown previously.

Note: Do not tighten the hex nuts yet. Leave the hex nuts loose to swivel the ISS base on the pole.

4. The two ends of the anemometer's U-bolt should now be pointing away from the mounted rain collector side. Slide the anemometer's mounting base over the protruding bolt ends. Place a flat washer, a lock washer and a hex nut on each of the bolt ends as shown above. Do not tighten the nuts yet.
5. Raise the ISS unit to the desired height on the pole and swivel it so the anemometer arm is pointing north.
6. Using an adjustable wrench or 7/16" wrench, tighten all four hex nuts until the ISS is firmly fastened on the pole.
7. Re-attach the rain collector cone by setting the cone back on the base so its latches slide downward into the latch openings on the base, then rotate cone clockwise.
8. Place the debris screen (shown in the illustration on page 1) inside the cone, "feet-down," over the funnel hole. When installing the ISS as a single unit, we recommend tucking the coil of anemometer cable between the rain collector cone and the ISS base.

Option 2: Installing ISS Only

1. While holding the mounting base against the pole, place the two ends of a U-bolt around the pole and through the two holes in the base.
2. Slide the metal backing plate over the bolt ends as they stick out toward the rain collector cone. Secure the backing plate with a washer, a lock washer, and a hex nut on each of the bolt ends. Do not tighten the nuts yet.

For the wireless ISS, swivel the ISS base so the solar panel is facing south (in the Northern Hemisphere), or north (in the Southern Hemisphere).

3. Tighten the hex nuts using an adjustable wrench or 7/16" wrench.
4. Re-attach the rain collector cone.
Set the cone back on the base so its latches slide downward into the latch openings on the base. Rotate the cone clockwise.
5. Place the debris screen (shown in the illustration on page 1) inside the cone, "feet-down," over the funnel hole.

Option 3: Installing Anemometer Only

1. While holding the mounting base against the pole, place a U-bolt around the pole and through the two holes in the base.
2. Place a flat washer, a lock washer and a hex nut on each of the bolt ends.
3. Swivel the anemometer until the arm is pointing north.

Note: If your anemometer arm cannot be mounted aiming true north, you will need to calibrate the wind direction on your console to display accurate wind directions. See your *Vantage Pro2 Console Manual*.

Finishing the Installation

Level the Solar and UV Sensors

If you have a Vantage Pro2 Plus station that includes a solar radiation or UV sensor, use the bubble level on the sensors as a guide to verify that the sensors are level.

Adjust the level by tightening or loosening the screws that hold each sensor onto the shelf.

Note: If you are installing the solar or UV sensors separately, see the Sensor Mounting Shelf installation manual and the Solar Radiation and UV Sensor installation manuals for more information.

Clearing Data Collected During Testing and Installation

Now that the ISS is mounted outside, any data that was collected in the Vantage Pro2 console during testing and mounting can be cleared.

To clear all the collected data on the console:

1. Press WIND so that graph icon appears adjacent to the wind data on the display.
Confirm that wind speed is displayed on the compass rose.
2. Press 2ND, then press and hold CLEAR for at least six seconds and until you see "CLEARING NOW" in the console ticker display.

Additional Mounting Option

Extending Wireless Transmission Range

Optional repeater stations can be used to extend the wireless transmission range.

- Wireless Repeater, AC-Powered (#7626)
- Wireless Repeater, Solar-Powered (#7627)
- Long-Range Wireless Repeater, AC-Powered (#7653)
- Long-Range Wireless Repeater, Solar-Powered (#7654)

Extending the Console Cable (Cabled ISS Only)

A cabled ISS can be extended up to 1000' (300 m) away from the console by using Davis Instruments extension cables (#7876).

Relocating the Anemometer

Using Extension Cables:

Note: Not all cables are compatible with your Vantage Pro2 system. To be sure they will work, order Davis extension cables from your dealer or directly from Davis Instruments.

The anemometer can be extended further than 40' from the ISS by using Davis Instruments extension cables (#7876).

Be aware that the maximum measurable wind speed reading decreases as the total length of cable from the anemometer to the ISS increases.

Note: If the cable length is greater than 540' (165m), the maximum measurable wind speed may be less than 100 MPH (161 km/h).

Using the Anemometer Transmitter Kit (Wireless ISS Only)

Use the Anemometer Transmitter Kit (#6332) to add an independent wireless transmitter to the anemometer. The kit allows the anemometer to function as a transmitter station sending wind data directly to the console, instead of transmitting via the ISS.

Remote Mounting the Solar Radiation and UV Sensors

The solar radiation and UV sensors have a 3' (0.9 m) cable. If you wish to install these sensors away from the ISS, you can extend the length of the sensor cables up to 125' (38 m) with Davis Instruments extension cables (#7876).

Optional Wireless Stations

You may use our optional wireless sensor stations to collect weather measurements, without the inconvenience of routing cables.

- Wireless Temperature Station (#6372)
- Wireless Temperature/Humidity Station (#6382)
- Wireless Leaf & Soil Moisture/Temperature Station (#6345)

For more details, please visit our website or see the most recent *Davis Precision Weather Instruments* catalog.

Maintenance and Troubleshooting

Maintaining UV and Solar Radiation Sensors

If the ISS is a Plus model and contains UV and solar radiation sensors, do not touch the small white diffusers on top of the sensors. Oil from skin reduces their sensitivity. If you are concerned that you have touched the diffusers at any time, clean the UV diffuser using ethyl alcohol with a soft cloth. When cleaning the UV diffuser, DO NOT use rubbing or denatured alcohols because they can affect accuracy of the sensor readings. Ethyl alcohol can be procured through an industrial or laboratory supply store. Clean the solar diffuser with a soft damp cloth.

Due to the sensitivity of ultraviolet and solar radiation sensors it is common practice for manufacturers to recommend re-calibration after a period of time. Users demanding high accuracy typically recalibrate their sensors annually. Here at Davis Instruments, we have seen less than 2% drift per year on the readings from these sensors.

Contact Technical Support about returning your sensor for calibration. See "Contacting Davis Instruments" on page 27.

Cleaning the Radiation Shield

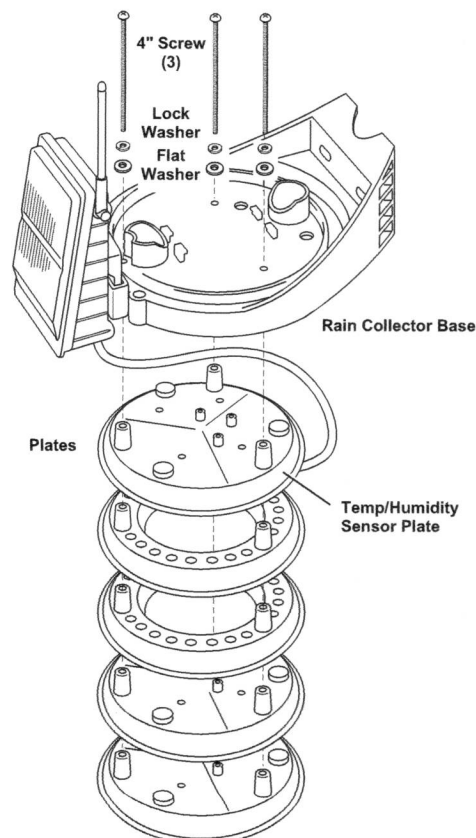
The outer plating of the radiation shield should be cleaned when there is excessive dirt and build-up on the plating. Use a damp cloth to clean the outer edge of each ring.

Note: Spraying down or using water excessively to clean the radiation shield can damage the sensitive sensors or alter the data and readings the ISS is transmitting.

Check the radiation shield for debris or insect nests at least once a year and clean when necessary. A buildup of material inside the shield reduces its effectiveness and may cause inaccurate temperature and humidity readings.

To thoroughly clean the radiation shield:

1. Remove the rain collector cone.
2. Using a Phillips head screwdriver, loosen the three 4" (~100mm) screws holding the radiation shield plates together.
3. Taking care to maintain the order in which the five plates are assembled, separate the plates as shown and remove all debris from inside the shield.



Note: For some models of the ISS, the order in which the five radiation shield plates are assembled may be slightly different than the order shown in the figure on page 25. For this reason, ensure that you always reassemble the plates in the same order in which they were disassembled.

4. Reassemble the plates in the same order in which they were disassembled, and fasten them together using a Phillips head screwdriver to tighten the 4" screws, as shown in the illustration.

Cleaning the Rain Collector Cone

To maintain accuracy, thoroughly clean the rain collector several times a year.

Note: Cleaning the rain collector and tipping buckets may cause false rain readings. Unplug the RAIN sensor from the SIM before cleaning so that no inaccurate readings are logged, or clear the weather data that was logged on the Vantage Pro2 console after cleaning is complete. See your *Vantage Pro2 Console Manual* for instructions on clearing weather data.

1. Separate the cone from the base by turning it counter-clockwise.
2. Use a soft, damp cloth to remove any debris from the cone, cone screen, and tipping bucket.
3. Use pipe cleaners to clear the funnel hole in the cone and drain screens in the base.
4. When all parts are clean, rinse with clear water.
5. Re-attach the cone and replace the debris screen.

Troubleshooting

If a Sensor Functions Intermittently

Carefully check all connections from the sensor to the ISS. See "Check SIM Sensor Connections" on page 4.

Loose connections account for a large portion of potential problems. Connections should be firmly seated in receptacles and plugged in straight. To check for a faulty connection, try jiggling the cable while looking at the display. If a reading displays intermittently on the console as the cable is jiggled, the connection is faulty. Try removing and then re-installing the cable to correct the faulty connection. If the sensor still functions intermittently contact Technical Support. See "Contacting Davis Instruments" on page 27.

Most Common Rain Collector Problem

If the rain collector seems to be under-reporting rainfall, remove the rain collector cone to clean the tipping bucket and clear out any debris. Make sure the cable tie around the tipping bucket has been cut and removed.

Most Common Anemometer Problems

"The anemometer head is tilted when I mount the anemometer."

With the Allen wrench provided in the supplied hardware, loosen the screws holding the anemometer head on the arm. (The screws are on the bottom of the anemometer head, by the wind cups.) Turn the anemometer head so it is straight and then tighten the screws.

"The wind cups are spinning but my console displays 0 mph."

The signal from the wind cups may not be making it back to the display. Remove the cups from the anemometer (loosen the set screw). Put the cups back onto the shaft and make sure to slide them up the shaft as far as possible. Check your cables for visible nicks and cuts. Look for corrosion in the WIND connector on the SIM and on splices in the cable. If using an extension cable, remove it and test using only the anemometer cable. Contact Technical Support and ask for a wind test cable if the problem has not been resolved.

Note: If the anemometer is sending no data, the wind display indicates 0 speed and a north direction.

"The wind direction is stuck on north, or displays dashes."

It is likely that there is a short somewhere between the wind vane and the display. Check the cables for visible nicks and cuts. Look for corrosion in the "WIND" jack on the SIM and on splices in the cable (if any). If possible, remove any extensions and try it with the anemometer cable only. If none of these steps get the wind direction working, contact Technical Support and ask for a wind test cable.

"The wind cups don't spin or don't spin as fast as they should."

The anemometer may be located where wind is blocked by something, or there may be friction interfering with the cups' rotation. Remove the wind cups (loosen the set screw) and clear out any bugs or debris. Turn the shaft the cups rotate on. If it feels gritty or stiff, contact Davis Technical Support.

Note: Do not lubricate the shaft or bearings in any way. When replacing the cups, make sure they are not rubbing against any part of the anemometer head.

"Readings aren't what I expected them to be."

Comparing data from your ISS to measurements from TV, radio, newspapers, or a neighbor is NOT a valid method of verifying your readings. Readings can vary considerably over short distances. How you site the ISS and anemometer can also make a big difference. If you have questions, contact Technical Support.

Contacting Davis Instruments

If you have questions about the ISS or Vantage Pro2 system, or encounter problems installing or operating the weather station, please contact Davis Technical Support.

Note: Please do not return items to the factory for repair without prior authorization.

(510) 732-7814 – Technical Support phone, Monday – Friday, 7:00 a.m. – 5:30 p.m. Pacific Time.

(510) 670-0589 – Technical Support Fax.

support@davisnet.com – E-mail to Technical Support.

info@davisnet.com – General e-mail.

www.davisnet.com – Download manuals and specifications from the Support section. Watch for FAQs and other updates. Subscribe to the e-newsletter.

Appendix

Specifications

Complete specifications for the ISS and other products are available in the Weather Support section of our website at www.davisnet.com.

Cabled ISS

Temperature range: -40 to 150° Fahrenheit (-40 to 65° Celsius)
Power input: Console cable from Vantage Pro2 console
Optional Vantage Pro2 AC power adapter

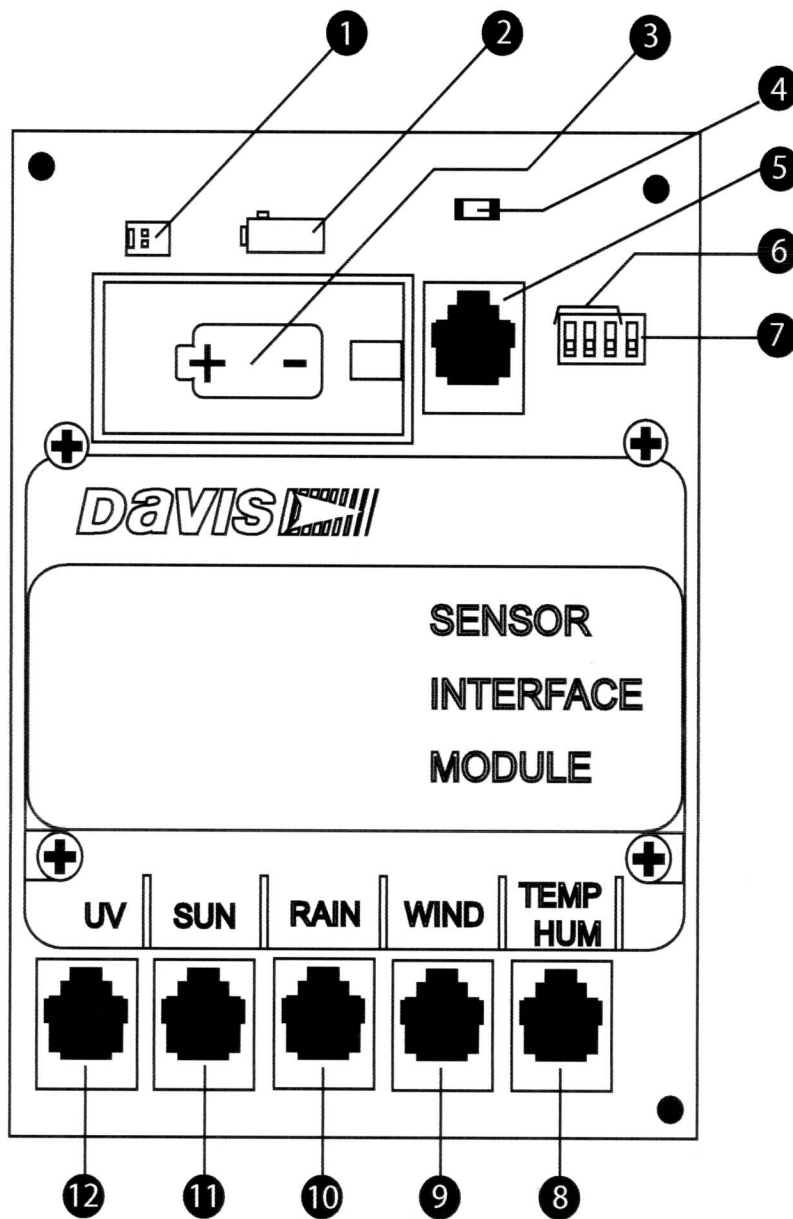
Wireless ISS

Temperature range: -40 to 150° Fahrenheit (-40 to 65° Celsius)
Transmission frequency: 902 - 928 MHz FHSS for North America
868.0 - 868.6 MHz FHSS for overseas versions: EU, UK, and OV
Transmitter ID codes: 8 user-selectable
License: Low power (less than 8 mW), no license required
Primary power: Solar power – Davis solar charger
Backup power: CR-123A 3-volt lithium battery (8 months without sun-light- greater than 2 years depending on solar charging)
Alternate power AC power adapter

ISS Weather Variable Update Intervals (Transmitter ID Dependent)

Wind speed: 2.5 to 3 seconds
Wind direction: 2.5 to 3 seconds
Accumulated rainfall: 20 to 24 seconds
Rain rate: 20 to 24 seconds
Outside temperature: 10 to 12 seconds
Outside humidity: 50 seconds to 1 minute
Ultraviolet radiation: 50 seconds to 1 minute
Solar radiation: 50 seconds to 1 minute

SIM Board Display and Contents



- | | |
|-----------------------------|---|
| ① Solar Panel Tab | ⑦ Test DIP Switch |
| ② AC Adapter Socket | ⑧ Temperature/Humidity Sensor Connector |
| ③ Battery Socket | ⑨ Wind Sensor Connector |
| ④ Test LED | ⑩ Rain Sensor Connector |
| ⑤ Cabled Connection | ⑪ Solar Radiation Sensor Connector |
| ⑥ Transmitter ID DIP Switch | ⑫ UV Sensor Connector |

Vantage Pro2 Integrated Sensor Suite Installation Manual

Document Part Number: 7395.249

Rev G (January 27, 2010)

For Vantage Pro2 Weather Stations #6322, 6322C, 6323, 6327, 6327C, 6328

For Vantage Pro2 Plus Weather Stations #6152C, 6162C, 6152, 6162, 6153, 6163

Copyright © 2010 Davis Instruments Corp. All rights reserved.

Information in this document subject to change without notice.


Davis Instruments Quality Management System is ISO 9001 certified.



3465 Diablo Avenue, Hayward, CA 94545-2778 U.S.A.

510-732-9229 • Fax: 510-732-9188

E-mail: info@davisnet.com • www.davisnet.com

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 11 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012		Review Date: 01/19/2013	Rev #: 2

APPENDIX 4



Monthly Precipitation Data Log

Month _____

Station ID	Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	in																	
18	19	20	21	22	23	24	25	26	27	28	29	30	31	Month Avg.				

Notes:

Report by: _____ Hector M Avila

Date: _____


Signature: _____
Position: Environmental Coordinator or Designee

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Engineering Manager or Designee

Date: _____

	Title: Rainfall Data Collection Management & Recordkeeping Procedure		Doc #: SOP-Eng-002	Prepared by: Hector M. Avila	AES Puerto Rico Guayama, PR	Page: 12 of 12
	Reviewed by: Ramiro Rivera	Area: Environmental / Operations	Effective Date: 01/19/2012	Review Date: 01/19/2013	Rev #: 2	

APPENDIX 5



AES PUERTO RICO, LP
Rainfall Data Collection Management
& Recordkeeping Procedure
ATTENDANCE FORM
EMPLOYEE PARTICIPATION

Date: _____

Name	Signature	Position

Trainer Signature: : _____